

SELECTIONS
FROM
EDUCATIONAL RECORDS
OF THE
GOVERNMENT OF INDIA

VOLUME IV
TECHNICAL EDUCATION IN INDIA,
1886—1907

Edited by
K.D. BHARGAVA

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FOREWORD

I have pleasure in presenting this volume on 'Technical Education in India' covering the period 1886—1907. It is volume IV under the series 'Selections from Educational Records of the Government of India' which is being published by the National Archives of India under the scheme of published records of historical significance for the pre-independence period, sponsored by the Ministry of Education. Under this programme, two volumes have already been published. The first covers Educational Reports (1859—71) and contains three important reviews of the state and progress of education in India, compiled in 1862 and 1867 by A. P. Monteath and in 1871 by Howell. The second volume discusses the Development of University Education (1860—87) and covers the documents leading to the establishment of Panjab and Allghabad Universities, and also includes the papers relating to the passing of Honorary Degrees Act I of 1884. The third volume on the 'History of Educational Administration (1859—97)' has however, been unfortunately delayed owing to circumstances beyond our control.

The present volume is based mainly on Mac Donnell's Not (1886) and Buck's Report (1901) on technical education in India. The former surveys the development of technical education since 1854 and contains an interesting account of the opinions expressed by the Presidencies and Provinces for giving effect to the suggestions made for the improvement of technical education. Buck's Report, besides making recommendations on practical and technical education, also contains his recommendations on general educational matters. The remaining documents in the volume contain valuable information regarding higher forms of technical education, Schools of Art, Industrial Schools and the institution of scholarships for the promotion of technical

education in India. The present volume contains only the main land marks in the introduction of technical education in India and its growth. The history of various important technical institutions in different provinces, *e.g.* Thomason Engineering College, Roorkee, and Victoria Technical Institute, Bombay, etc., has purposely been not covered in this volume, since we propose taking up the subject of development of technical education in different provinces in the next volume.

In editing the next, the copies have been carefully compared from the point of view of accuracy of language and printing errors have been corrected. With regard to use of capital letters and punctuation, the text has been modernised, to a certain extent, for easy reading, but such changes have been reduced to the barest minimum. I hope the volume will serve the desired purpose.

I am grateful to Shri U. N. Sarkar, Assistant Director of Archives, for bringing out this volume in its present form. I am also grateful to other members of the Educational Records Division particularly Dr. Y. B. Mathur and Shri S. N. Sharma for the substantial contribution they have made in bringing out this volume.

NEW DELHI;
The 30th April, 1968

K. D. BHARGAVA
Director of Archives.

CONTENTS

	PAGES
FOREWORD	iii—iv
INTRODUCTION	1—6
DOCUMENTS	7—280
1. Memorandum on Technical Education in India prior to 1886 by Sir A. P. MacDonnell, dated 23rd July, 1886	9—84
2. Resolution on Industrial Education and on Industrial Survey of India, dated 18th June, 1886	85—88
3. Sir A. Colvin's Minute on Technical Education, dated 8th September, 1890	89—107
4. Extract from Resolution on Technical Education, dated 7th September, 1894	108—115
5. Sir E. C. Buck's report on Practical and Technical Education, 1901 .	116—195
6. Letter to Local Governments regarding encouragement of Technical Education, dated 20th November, 1901	196—201
7. Resolution of Simla Conference on Technical Education, 1901 .	202—207
8. Despatch to the Secretary of State regarding Technical Scholarships, dated 9th October, 1902	208—212
(a) Despatch from the Secretary of State on Technical Scholarships, dated 29th May, 1903	213—219
(b) Letter to Local Governments regarding Technical Scholar- ships, dated 21st September, 1903	220—221
9. Resolution of the Government of India on the report of the Committee on Industrial Schools, dated 14th January, 1904	222—232
10. Resolutions passed by the National Industrial Conference, 1907 .	233—280
APPENDIX	281—314
BIOGRAPHICAL SKETCHES	315—332
BIBLIOGRAPHY	333—334
INDEX	335—353

INTRODUCTION

INTRODUCTION

The question of technical and industrial education had been before the Government and the public even before Sir A. P. MacDonnell wrote his memorable note on "Technical Education in India" in 1886. There is probably no subject on which more had been written or said, while less had been accomplished. There had been more than enough of theoretical discussion and it was considered necessary now to give a practical shape to problems on which there was general agreement. The present volume describes the achievements in the field of technical education from 1886 to 1907.

The origin of the idea of providing technical education to the people of India occurs in the following words of the Educational Despatch of 1854 from the Secretary of State:—

"Our attention should now be directed to a consideration, if possible, still more important, and one which has been hitherto, we are bound to admit, too much neglected, namely, how useful and practical knowledge suited to every station in life may be best conveyed to the great mass of the people."

At that time, however, a purely literary education had not produced a supply of candidates for employment in excess of the demand, while there were few of those industrial enterprises which have since so largely developed. It is not surprising, therefore, that for a number of years much attention was not given to the teaching of more practical knowledge.

When, however, the number of purely literary scholars unable to find employment grew up and continually increased, and when mining, manufacturing and other large industries began to develop, it was felt that education in India should be adapted to suit the changed conditions. Moreover, the need of industrial occupation for a larger portion of the people came into prominence with the rapid increase in the agricultural population.

A number of questions connected with education in India were considered by the Education Commission of 1883 and in regard to technical instruction, though this was not one of the matters

which they were required to report upon, they advised the introduction of a "modern" side into High Schools. The orders of the Government of India upon this recommendation were published in paragraph 21 of the Resolution No. 10/399, dated the 23rd October, 1884 as follows:—

"The bifurcation of studies suggested by the Committee is of special importance at the present time. Every variety of study should be encouraged, which may serve to direct the attention of native youth to industrial and commercial pursuits."

In July 1886 a note was drawn up by Mr. A. P. MacDonnell, Home Secretary, examining the condition of technical education in the various provinces and the steps taken by each Local Government and Administration to give effect to the orders of the Government of India (quoted above) enforcing the necessity of improvement in the matter of practical and industrial training. It was found that nowhere, except in Madras, had any practical steps been taken to give effect to these orders. The note then proceeded to indicate the direction which, and the means by which, it was thought technical education should be imparted in the different provinces. Generally as regards Engineering it was pointed out by Mr. A. P. MacDonnell that the defects in the colleges at Calcutta, Madras, Poona and Rurki, seemed to lie in the *too theoretical nature of the teaching*, in the complete isolation of these colleges and in the want of facilities for practical instruction at Madras and Rurki; whilst there was an entire want of elementary and secondary schools leading up to the college courses. It was further urged that Industrial schools and technical education should be considered not something separate and apart from ordinary general education, but as a development of such education. It was, therefore, suggested that the rudimentary principles of science should be taught as soon as some progress had been made with the "3 R's", and that the study of drawing should be introduced at the earliest possible age. It was thought that this would lead to 3 divergent courses at the end of the middle school course leading—

1. to the literary side of the High School;
2. to the "modern" side of the High School;
3. to divisional or district technical school which would be under a Central Institution such as a Technological Institute.

While the Local Governments and Administrations were considering how far these suggestions met with their concurrence and what steps they proposed to take in connection with them, the Government of India had under review the state and progress of general education throughout India and in paragraphs 22-25 of Resolution No. 199 of the 18th June, 1888, dealt with the conditions of the question of technical education in India. It was pointed out that technical education consists of (1) technical education of a preliminary character including the study of natural science and the cultivation of the faculty of observing and reasoning from experiment; (2) technical education proper which is the preparation of a man to take part in producing effectively some special article of commercial demand. Technical Education proper is an auxiliary of manufacture and industrial capital. The application of capital to industry in India has not yet been largely developed, but it is increasing. It would therefore be premature to establish technical schools on a large scale, and thereby aggravate the present difficulties by adding to the educated unemployed a new class of professional men for whom there is no commercial demand. Still, it was said, a large field is open in the direction of promoting special technical education suitable to the immediate requirements of the country and capable of expansion with its growing necessities. The Government of India further thought that technical schools would be useful at the centres of such industries which are in some degree centralised, which are growing into importance with the new growth of trade and manufactures and which are capable of improvement by the application of scientific principles to materials and processes. It was stated that schools of drawing and design might undoubtedly with great advantage be attached to the great railway workshops and factories, and that probably in large stations and municipal towns there would be a demand which would repay those who acquire superior skill in local industrial schools. It was added that with the expansion of capital and the development of material resources of the country, the larger development of special technical education might be fostered in complete harmony with the sound principle that supply should follow demand. The Governor-General in Council went on to say that though the subject was of extreme importance, the insignificance of what had been attempted in India was very conspicuous. It was suggested that Local Governments and Administrations should on a convenient but early opportunity take action in two ways, viz.:—

- (1) that an industrial survey of all the important local industries should be completed;

- (2) that a Committee of educational experts and professional men, who should make suggestions with a view to turning the knowledge required by such a survey to the best account, should be formed in each province.

Sir A. Colvin's Minute of the 8th September, 1890 shows how these orders of the Government of India were carried out in the North-Western Provinces. According to him the proposed reorganization of the North-Western Provinces Engineering College at Rurki would be an important measure necessary to develop the policy of the Government of India in regard to technical education. Sir Charles Iliot held a similar view regarding the Bengal Engineering College at Sibpur for the promotion of technical education in the Lower Provinces. Attention in this connection is invited to Bengal letter No. 361-T.G. dated the 9th October, 1891, and especially to the concluding words:

"His Honour has made it known that he will encourage the establishment, by District Boards and through other agencies, of local schools of technical instruction, wherever effective demand for them may arise; but it is to the maintenance of the Calcutta School of Art and of the Sibpur Engineering College on the highest possible scale of efficiency and to their future development in various, if as yet unforeseen, lines, that the Lt.-Governor is chiefly inclined to look for the promotion of technical education".

In 1901 Sir Edward Buck made certain enquiries about practical and technical education and the results of his enquiries were considered by the Simla Conference. The conclusions reached by the Government of India were that industrial schools were required, but that before entering such schools, pupils should be grounded in the three R's, in fact, that industrial education should follow, and not precede, a certain amount of general education. The principles accepted were:

"that industrial schools should be devised to encourage particular local industries or trades; that the best type is the local or craft school, that they should be educational, and not commercial institutions, that in country districts they should be devoted to the study and development of single indigenous products; that in towns they should deal with manufacturers, and that the several industries may there be collected in the building; that only pupils shall be ad-

mitted to a school who intend to practise the trade taught there; that the system of paying pupils to attend such schools should be abandoned and fees levied where this is advisable without injuring the stability and popularity of the school; and that grants-in-aid should be given to assist craft schools, established by private agency to develop local industries”.

A Committee was appointed to implement these proposals; but in turn they proposed an alternative system of industrial instruction, based upon that followed in a school of a reformatory type in Naples. This alternative system was rejected by the Government of India and the matter was left with a fresh statement of principles and an invitation to Local Governments to work out salvation somehow. The matter, so ran the resolution, had not yet passed the stage at which many experiments must be tried and a proportion of failures must be expected. A distinction should be made between (i) great industrial centres where capital is employed in the organization of industries on a large scale, and (ii) towns in which local industries are practised as handicrafts. For the former wholtime schools should be set up and pupils should be admitted to them only after passing a comparatively high standard of general education. For the latter a special and practical form of school would be required, half the day being spent in general instruction adopted to the requirements of a particular craft, the remainder of the time being spent in learning the craft itself.

So the matter remained until 1907, when Sir John Hewett, the Lt.-Governor of the U.P., summoned a strong and representative conference at Nainital to mature proposals for the development of technical education of different kinds in the United Provinces. The conference included a large number of experts and businessmen from different parts of India, and its conclusions represent the best body of opinion yet collected on the subject. The problems before the conference were:

- (1) how to adjust general education so as to predispose boys to industrial work or break down prejudice, already showing signs of being shaken, against manual labour;
- (2) how to train technical: (a) workman, foreman and traders or managers for the large organised industries employing machinery; (b) investigators; (c) workmen in local industries practised as handicrafts; (d) technical instructors.

In disposing of this problem certain axioms or propositions were laid down, as containing the results of experiences in other countries. These were:

- (1) Technical work must be connected with a local industry and have a definite object;
- (2) The teacher should be a practical expert and be given a free hand, "in scientific branches he should be an investigator, and have time for research; in the manipulative branches he should have been in works;" and
- (3) Money must be spent freely on experimental work and in keeping up to date all apparatus, tools, plant and appliances.

In no country has the last word, or anything like the last word on technical education been said, but in every country it has been found difficult to keep technical education practical aligned on a definite object and useful to those who have to earn their living by their labour; and these propositions represent the wisdom accumulated by much effort, often misdirected, in different quarters of the globe.

To keep education practical that is now the object of educational policy. The views of the idealist in the educational field of a generation ago have yielded to the pressure of material civilisation. This movement synchronizes with great changes in the realm of political thought. There also industrial considerations dominate and transform the constructive work of policy. The modern doctrines of national efficiency have risen almost with a volcanic force from the depths of society in the progressive nations of the West. Not how to develop the faculties of the few on the lines of natural growth, but how to prepare the many for the struggle of existence and increase national wealth as a means of individual well-being is now the aim and end of education in the West. A similar movement is apparent in spasms of energy that have shaken the meditative and melancholy East, although the movement has so far spread only along the surface and has not risen from below. How it will end, what blessings it will confer, what misfortunes may attend it, none can foretell, but it cannot fail to quicken a desire for improvement, and it may be that it will introduce an element of greater hopefulness into Indian life.

DOCUMENTS

MACDONNELL'S NOTE ON TECHNICAL EDUCATION IN INDIA

Introduction of technical education—existing state in various provinces—steps taken by Provincial Governments to give effect to Government of India's orders regarding improvement in practical and industrial training—changes in the system of technical instruction suggested.

HIS EXCELLENCY the Viceroy has expressed a desire that a memorandum on the condition and prospects of Technical Education in India should be prepared and submitted to him. The following Note is an endeavour to fulfil His Excellency's commands.

1. The Education Commission, in reviewing the history of education in British India, divide the subject into three periods. They observe that each period is marked by a distinctive character of its own, which is common, more or less, to all the provinces of the Empire.

Introductory: Division of progress in education into three periods.

2. The first period embraces the years of educational activity prior to the Court of Directors' well-known despatch of 1854, when a new departure was taken. During this period the responsibility of the State for the education of the people was unacknowledged, and much of the good work then done was due to the endeavours of missionary and other philanthropic bodies, sometimes with, sometimes without, official assistance. The distinctive character of this period was, as far as State efforts were concerned, the attention which was paid to collegiate education.

3. The second period in the educational history of British India was ushered in by the great despatch of 1854; and lasted till 1871. Public instruction now became a recognized State obligation; but administratively the distinctive character of the period was the extension of secondary education, that is, of schools in which English is the medium of instruction, and the final standard aimed at is the University Entrance Examination.

4. The third period covers the interval between 1871 and the present time. It dates from Lord Mayo's decentralization scheme, and is contemporaneous with the control of Local Governments over educational matters in their respective provinces. Its distinctive character is the attention which has been paid to elementary instruction among the masses of the people.

5. This broad division of the educational history of British India into three periods loses sight, however, of some well-marked and interesting stages; and to give due prominence to these, the first period might well be sub-divided into three. The first sub-division would end about the year 1825, when effect was given to that provision of the Charter Act of 1813 which appropriated a lakh of rupees annually for educational purposes, and when the first *neuclei* of Committees of Public Instruction were established in the three presidencies. The distinctive character of this sub-period was the great activity of missionary bodies in the cause of education, and the small recognition afforded by the Government, always immersed in war, of its duty in the same cause.

The "Anglicists" advocated education through the medium of English and the Vernaculars, in accordance with modern ideas; Orientalists advocated education through the medium of the Oriental classics on old established rules. The controversy was decided in favour of English and the modern system, chiefly through the powerful aid of Macaulay, then Legal Member of Council.

The second sub-period may be considered as ending about 1840, after the publication of Lord Auckland's famous minute, by which the great controversy between the "Anglicists" and the "Orientalists" was finally decided in favour of the former. This period was marked, not only by the controversy just referred to, but by the consolidation and extension of educational Boards and Committees which, in the previous period, had struggled into existence.

The third and last sub-period ended in 1854 with the reception of the Court of Directors' great Educational Despatch of that year, and was, as the Education Commission say, distinguished by the attention paid to higher or collegiate education. Funds were scarce; and Indian administrators during this period were satisfied with the "downward filtration" theory of education.

6. Thus from the commencement of this century,—and, as far as Public Instruction is concerned, this practically means from the commencement of British rule,—education in India has passed through five cycles, each cycle covering a period of about fifteen years. First, there was the stage of missionary activity and State quiescence; then a stage of spasmodic and unsystematized official effort; next, systematic administration directed mainly towards the promotion of collegiate education; fourthly, the recognition of public instruction as a State obligation and an effort to fulfil it by the extension of secondary schools; lastly, the systematic development of elementary education among the masses of the population.

7. In the preceding sketch of the progress of education in British India, it will be observed that no reference

Origin of Technical Education.

a passage, quoted in

“Our attention should now be directed to a consideration, if possible, still more important, and one which has been hitherto, we are bound to admit, too much neglected, namely, how useful and practical knowledge suited to every station in life may be best conveyed to the great mass of the people who are utterly incapable of obtaining any education worthy of the name by their own unaided efforts; and we desire to see the active measures of Government more especially directed for the future to this object, for the attainment of which we are ready to sanction a considerable increase of expenditure.”

has been made to Technical Instruction. It is, indeed, true that in the despatch of 1854 a passage, quoted in the margin, occurs which might almost be construed as an encouragement and direction to establish Technical schools. And, having regard to the history of the question, such a construction could be scarcely regarded as strained. The great advantages of Technical Instruction had in 1854 been brought home to the public mind in England. A Select Committee of the House of Commons had in 1835 enquired into the best means of extending among the manufacturing population a knowledge of the principles of Art and Design; and a “Government School of Design” established in London, with a system of grants-in-aid to similar schools in the manufacturing districts, had grown out of that enquiry. The progress made, however, was small, until the International Exhibition of 1851 drew public attention to the deficiencies as regards art of the English workman, and as regards science of the English manufacturer. The result was the creation in 1853 of the Department of Science and Art, which three years later came under the control of the Department of Education. It is, therefore, a not altogether improbable inference

that the enlightened man* who drafted the despatch of 1854 had,

*Believed to be the late Mr. J. S. Mill¹

by the passage quoted in the margin above, intended to suggest a far-reaching scheme of Technical and Industrial Instruction for India.

8. But if any such intention was entertained, it was not fulfilled—a result which should surprise no one,

Growing necessity for Technical Instruction in India.

seeing that for Government employment the market then was not overstocked, while there were in India at the time but few of these mining, manufacturing, and other industrial enterprises which now afford such strong inducements to Technical training. Since then things have greatly changed. The supply of eligible candidates for Government service has far outrun the demand. The Bar, the

¹This is evidently a mistake.

Medical, and the Engineering professions absorb only a small portion even of our University graduates. Our schools and colleges are yearly adding to the crowd of young men whom our system of education has rendered discontented with the sphere of life to which they were born without fitting them for another. The difficulty is a growing one, and its seriousness is appreciated by all sections of the public. The following extract from a Native newspaper, *The Mahratta*, of May 9th, is a fair sample of the opinions which, at the present time, find constant expression in the Native Press:—

We have had, roughly speaking, but a very short experience of the English liberal educational system; for a period of 25 or 30 years counts for little in a nation's life. And yet even in this short existence our experience has been rather costly. We have had educated in the various institutions supplied by Government hundreds of young men who have for the past few years found that their energy has been uselessly taxed; for their learning and labour make no difference in their position and prospects, or have rather changed these for the worse. We see on all sides a crowd of young men who have received a more or less liberal education, and who are whiling away their time in applying to the heads of several departments for employment. They curse their fate, which has left them unprovided for after a bootless labour of some ten or twelve years. They have a smattering knowledge of several subjects, but they have gone deeply in none, and even that smattering knowledge of theirs proves of no avail to them in the severe struggle for life that is going on around us. They find that their knowledge is of no help to them in the world where practical training is all that is respected. We do not mean to disparage liberal learning. Its importance and value have been for ages recognized by all men. It is not for us to speak ill of it. It is beyond our power. We do see its benefits in our midst. How can we then speak in a disparaging tone of it? But we can say that liberal education is a costly thing, and, for those who have to labour very hard for winning their bread, it is useless. It is an ornament, and as such those only who are in easy or affluent circumstances can derive advantages from it. The greater majority are doomed to walk in humbler sphere of life which demands high training of a special kind, and hence, after an experience of the last 25 years, people are now beginning to see that greater attention must now be paid to this practical training which will fit men to their avocations in life, and which will, moreover, enable them to introduce improvements in industries and handicrafts.

A wave is passing over the country, agitating the minds of the people and drawing their attention to this subject. There is a stir on all sides—a stir which promises to result in some practical steps being taken to remedy the evil. The Bengalee, the Madrasee, and the Bombayite, each is now trying, to the best of his power and ability, to suggest a solution of this great educational problem of the day. But the movement is stronger on the Bombay side. Why, even ordinary men, from whom you would never expect any active interference in the public movements of the day, are coming forward with proposals for the establishment of Technical schools.

9. Most questions of importance regarding education in India are fully and lucidly handled in the Report

The Education Commission on Technical Education.

of the Education Commission, but the subject of Technical Instruction is an exception to the rule; for Technical Instruction was one of the

few matters* connected with education on which the Commission was not required to report. It is true that in

*The other matters were Universities and the education of Europeans and Eurasians.

the resolution appointing the Commission, attention was called to the onesidedness of the existing system of secondary education, and that the Commission, in response to that call,

proposed a bifurcation of the curriculum in High Schools,—one course leading to the University, and the other fitting boys for commercial pursuits; but this is only touching the outer fringe of the great question with which it is now proposed to deal.

10. Although the Education Commission were thus not required to discuss the subject of technical training,

Recommendation of the Education Commission regarding practical training in schools.

their comprehensive report could not entirely ignore a question which was rapidly growing in importance in public estimation. Accord-

†Education Commission Report, pages 219-22.

ingly in the Commission's Report certain observations† on the subject occur, which it is desirable to quote in this place:—

Throughout India high schools have hitherto been regarded, not only or chiefly as schools for secondary instruction, intended for pupils whose education will terminate at that stage, but in a much greater degree—it may almost be said exclusively—as preparatory schools for those who are to become students of the University. It has been seen that middle schools comprise two well-

marked classes,—those in which the scheme of studies is, and those in which it is not, governed by university standards. With one exception‡, which will be presently noticed, no such distinction exists in the case of high schools, in all of which the course of

instruction is determined by the matriculation standard, which, again, is arranged solely with a view to subsequent University studies. One of the questions put to witnesses before the Commission ran as follows:

“Is the attention of teachers and pupils in secondary schools unduly directed to the Entrance Examination of the University?” The replies to this question are singularly unanimous. It has been felt in all provinces, and urged by many witnesses, that the attention of students is too exclusively directed to University studies, and that no opportunity is offered for the development of what corresponds to the “modern side” of schools in Europe. It is believed that there is a real need in India for some corresponding course which shall fit boys for industrial or commercial pursuits, at the age when

they commonly matriculate, more directly than is effected by the present system. The University looks upon the Entrance Examination not as a test of fitness for the duties of daily life, but rather as a means of ascertaining whether the candidate has acquired that amount of general information and that degree of mental discipline which will enable him to profit by a course of liberal or professional instruction. In these circumstances, it appears to be the unquestionable duty of that Department of the State which has undertaken the control of education to recognize the present demand for educated labour in all branches of commercial and industrial activity, and to meet it, so far as may be possible, with the means at its disposal. The Hon'ble Mr. Justice West, Vice-Chancellor of the University of Bombay, has expressed his views on this point in the following terms: "The preparation for ordinary business may with advantage proceed up to a certain point along the same course as that for literature and science. It is a defect of our system, as I understand it, that it does not provide for a natural transition to the further studies which may be the most proper for a man of business, nor even propose to encourage and conduct such studies. When a boy reaches the age of about fourteen, he may have plainly shown that he has not the gifts that would make him a good subject for literary culture. *His tastes or his circumstances may disincline him to be an engineer or chemist. He ought not then to be forced on in a line in which failure is almost certain. He should be put to work on matters that he really can master, unless quite exceptionally dull, such as arithmetic, rudimentary economics, mercantile geography, the use of manures, or others determined by the locality of the school and its needs.....* The extension of this knowledge *should be along those lines where it will be grasped and incorporated by the interests and teachings of active life. Still it should be education, aiming at making the mind robust and flexible, rather than at shabbily decking it with some rags of "business information" or low technic skill. For these different aims, the present system makes no sufficient or distinct provision.*"

We do not attempt to define the course of instruction which might be imparted in schools of the kind suggested. The Departments in many provinces have dealt satisfactorily with the question of independent courses in middle schools; and it may well be left to them, in consultation with school managers and others interested in education, to determine the character and constitution of similar schools of a more advanced kind. Indeed, to attempt to fix a course for "independent" high schools would be to fall into an error of precisely the same character as that against which the proposal is directed; it would be to substitute one uniform course for another. But what is now chiefly needed is variety; so that the educational system as a whole may be such as more fully to meet the needs of a complex state of society. Nor would the introduction of the proposed alternative

[The italics are not in the original. The present writer differs from the view expressed in so far as he is convinced that the bifurcation should take place earlier. On this point he agrees with the Madras Government, as will appear later on.]

course into high schools involve any great expenditure: *for the bifurcation of studies need not take place until the student is within two years of the Entrance Examination, that is, until he has been eight or nine years at school.* His studies in the middle department will be sufficiently practical to prepare him for those he will take up in the modern side, sufficiently liberal to fall in with those of the academical side. It may be added that, with the establishment of these schools, full recognition would be given to the salutary principle

that the course of instruction in schools of every class should be complete in itself. The Madras Provincial Committee draws attention to the fact that little more than half of those who pass the matriculation examination of that University proceed to the First Arts standard; and though the disparity is less conspicuous in other provinces—in Bengal, indeed, it is stated that more than 90 per cent. of those who matriculate are admitted to colleges,—yet it is probable that in all provinces the institution of the alternative standard would meet the popular wishes and answer a real need. We therefore, recommend *that in the upper classes of high schools there be two divisions—one leading to the Entrance Examination of the Universities; the other of a more practical character, intended to fit youths for commercial or non-literary pursuits.*

Further on in their report the Commission recommend that a certificate of having passed by either of the alternative courses should be regarded as qualifying for the public service in its subordinate grades.

11. The preceding extract expresses the Commission's view as to the general direction to be followed in grafting a system of practical training on our present scheme of secondary instruction; but it will be observed, that the training recommended was of a general or preparatory, and not of a technical, character. The Government of India, however, in reviewing the Commission's Report, was desirous of giving the recommendation the fullest significance which could be attached to it; and, therefore, having previously secured the consent and support of Local Governments, His Excellency the Viceroy in October 1884 sanctioned the publication of a Resolution, from which the following passage is quoted:—

The bifurcation of studies suggested by the Commission is of special importance at the present time. Every variety of study should be encouraged which may serve to direct the attention of Native youth to industrial and commercial pursuits. To be of any value, the bifurcation should be carried out, as the Commission advise, in the High School course. To postpone it till after matriculation at the University, as proposed by some authorities, would to a great extent render its advantages futile.

The Government of India commends the other general recommendations of this chapter to the adoption of Local Governments..... Efforts should be made to call forth private liberality in the endowment of scholarships not only in Arts Colleges, but for the encouragement of Technical Education.

Such was the policy which the Government of India, after a careful examination of the facts, promulgated on this question. That policy enforced the necessity of making the course of study in High Schools more practical than it was; and it recognized the

desirability of encouraging Technical Instruction. Beyond such a recognition, however, the Education Commission or the Government of India did not then go. No indication was given of the direction in which, or of the means by which, such Technical Instruction might be imparted. In this note an effort is made to supply such an indication.

PART II

12. Before attempting to make any suggestions for the promotion of Technical Instruction in India, it is essential to form a conception of the present condition of Technical education in the various provinces, and of the steps which are being taken to improve that condition. The position on both points must be correctly appreciated before any proposals can be made in the way of modification or extension of existing arrangements. The following remarks, therefore, are intended to be as brief a statement as the subject will allow of the present position of Technical education in the various provinces of the Empire, and the nature of the steps which are being taken to extend and improve it.

13. Technical education may be divided into two classes—University education and School education. The following statement [on p. 18] is intended to show at a glance the various classes of Technical colleges and schools already in existence, the number of institutions of each class, and the attendance at the close of the last school year.

14. Before any comment is offered on the figures for each province, a comparison is invited between the statistics of Technical Instruction exhibited in the foregoing statement [on p. 18] and the condition of education generally throughout the Empire. The latest educational returns show that the total number of pupils under any sort of instruction in Public (including Aided) Institutions in British India is about 3,095,000. Of these, about 2,665,000 pupils were under instruction in primary or rudimentary vernacular schools, in which practically no sort of technical training is given. The remaining 430,000 were receiving an education of a more advanced description, and three-fifths of them were learning English. But to only 6,287 of these 430,000 students was an education of a technical

or professional character being imparted, whereby they could earn an independent livelihood.* If it be remembered that the vast

*There are 141 training schools for masters and mistresses, attended by 5,132 students; but these are mostly normal schools, intended to provide teachers for village primary schools. The number of children attending the Drawing and Agricultural classes in Bombay has also not been included, as the instruction is only rudimentary and not exclusively technical.

mass of these students belongs to the lower middle classes, whose patrimony is chiefly their education; that the landed proprietors are not largely represented in our schools and colleges; that trade and commerce contribute no more than a tithe of the number of pupils, the full significance of the above figures will be appreciated, and the urgent necessity of giving to, at all events, some branches of our system of State education a more practical bent will be perceived.

15. Turning from the main aspect of the statement to its de-

Condition of Technical Education in the Universities.

tails, some remarks may now be offered on the arrangements which exist for Technical Education in the Universities of the various

provinces, beginning with Madras.

MADRAS PRESIDENCY

The Madras Presidency contains only one School of Law,—

Law. that attached to the Presidency College. The degrees given are Bachelor and Master in

Law; and to qualify for the Bachelor's degree, candidates must have obtained the degree of Bachelor in Arts. One hundred and twenty-seven students attended the school last year on payment of a term fee of Rs. 50 each. Fifty-seven students presented themselves for the B.L. degree, of whom only 24 passed, the result contrasting unfavourably with those of preceding years. Radical changes in the working of the Law classes were, however, sanctioned in 1884, and an additional Professor appointed. The work is divided between two Professors according to a scheme approved by the Department of Education, each Professor giving tutorial class instruction as well as instruction by lectures. The latest Educational Report states that these changes are calculated to "produce substantial results by raising the general legal knowledge throughout the Presidency." It would seem, then, that no further improvement is immediately called for in regard to the Faculty of Law in Madras.

Statement showing the condition of Technical

	University Education						School					
	Law		Medicine		Engineer- ing		Schools of Art		Schools of Law		Medical Schools	
	No. of Colleges	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance
Madras .	1	127	1	124	1	19	1	162	..	..	5	197
Bombay .	2	244	1	277	1	102	1	251	..	..	3	257
Bengal .	8	649	1	132	1	42	1	157	..	..	7	672
Punjab .	..	..	..	..	..	..	1	85	1	71	1	188
North-West- ern Provin- ces .	3	111	..	..	1	155	..	..	..	..	1	89
Central Provinces .	..	..	..	..	..	..	..	..	..	..	..	..
Assam .	..	..	..	..	..	..	..	..	..	..	..	..
Burma .	..	..	..	..	..	..	..	..	..	..	..	..
Hyderabad Assigned Districts	..	..	..	..	..	..	..	..	..	..	..	..
Coorg .	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL .	14	1,131	3	533	4	218 [318]	4	655	1	71	17	1403

There is also a Forest School at Dehra Dun and one at Poona.

Education in British India in 1884-85.

Education						Classes in High Schools in				Grand Total	
Engineering and Surveying Schools		Industrial Schools		Schools of Agriculture		Art		Agriculture		Institutions	Attendance
Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance		
1	106	6	249	1	96	..	..	..	..
2	98	7	307	1	46	36	2,713	8	289		
5	278	5	172	..	..	..	..	..	..
..	..	4	93	..	..	..	..	..	..
..	..	2	186	..	..	..	..	..	..
..	..	19	316	..	..	..	..	..	..
7	163	1	18	..	..	..	..	..	..
5	110	1	38	..	..	..	..	..	..
..		
..		
20	755	45	1,379	2	142	36	2,713	8	289	154	9,289 [9,389]

16. The Madras Medical College, established as a Medical School in 1835, was raised to the status of a Medicine. College in 1851, and affiliated to the Madras University in 1877. Its certificates are recognized by the Colleges of Surgeons of London, Edinburgh and Dublin—a recognition which, it is stated, induces many students to proceed home for their degrees in preference to graduating in the Madras University. The College has a senior division leading to the University degree, and a junior division for the education of the apothecary or medical practitioner class. Last year the senior division contained 120 male and 4 female students; the junior division contained 91 students, 7 being females. The instruction is stated to be all that need be desired; but the number of candidates for degrees has hitherto been very small, owing, it is stated, to the preference shown for British degrees.

17. The Madras Civil Engineering College consists of two Civil Engineering. departments—the Collegiate and the School Departments. After a prolonged discussion, the College was reorganized last year. The object of the Collegiate Department (which was established in 1862) is to train students, who have received a liberal education, for employment as Engineers or for the degree of B.C.E. in the Madras University. There is also a Mechanical Engineering class. One engineer's appointment in Government service is guaranteed annually to the College; but still the College is quite local in its effects, and the Public Works Department of the Government of India knows very little about its results. In all Departments the course seems to be wholly theoretical, which is a serious defect.

The School Department trains students for the subordinate engineering posts under the Public Works Department, Local Funds, Municipalities, and there are also classes for surveyors and draftsmen. The upper subordinate (i.e., School) students have a year's practical training after leaving the School before appointment to the public service.

The average number of students on the roll of the Collegiate Department last year was 19 and in the School Department 106. These numbers are an improvement on preceding years, and the Report for 1883-84 stated that applications for admission to the Collegiate Department are more numerous than the accommodation and teaching capacity of the Institution can meet. The popularity of the College is said to be increasing, while students of merit are reported to find no difficulty in getting employment. The great

want seems to be facilities for practical training, which, having regard to the existence in Madras of large railway *termini* and workshops, ought not to be insurmountable.

BOMBAY PRESIDENCY

18. There are two Schools of Law in the Bombay Presidency—the Government Law School and the Law Class of the Deccan College. The foundation of the former is due to a subscription raised to perpetuate the memory of Sir Erskine Perry, formerly Chief Justice of Bombay, and for many years President of the Bombay Board of Education. The Law classes of the Deccan College were established in 1884 with the object of enabling students of that College to keep some of their law terms while undergraduates. Both Schools are affiliated to the University; but the lectures in the Deccan College deal only with the introductory subjects, which form the first year's course in the Government Law School. The students attending the Law School number 180, while those attending the class in the Deccan College number 64. The Government School of Law at Bombay seems to be on a satisfactory footing, but the following rather scant notice is all that appears in the last Education Report regarding it:—

Seventy-nine candidates presented themselves for examination, of whom 54 successfully passed it. Thirty-four candidates presented themselves for the LL.B. Examination of the University of Bombay, of whom 13 passed.

19. This College was established in 1845 as a tribute to the memory of Sir Robert Grant, who was Governor of Bombay. It was affiliated to the Bombay University in 1860 as a College for Medical education. Its students are divided into two classes—those who are educated for the University degrees, and those who are educated for the grade of Apothecary; the former numbering last year 277, and the latter 76. Besides these, there were 17 female students. Dr. Cook, the Principal, in reviewing the events of the thirty-ninth year of the existence of the College, remarks as follows:—

It is hardly needful for me to point out how great a boon the institution of a Medical School such as this has proved to the rapidly-growing city, whose need of medical aid has annually increased with its increasing numbers, and which, while, on the one hand, it has tendered its plea for extended assistance from skilled medicine, has on the other, preferred its educated sons as students in such numbers that the College is taxed almost beyond its strength and resources to meet the demands on its teaching capacity. The annual reports for several years have with pleasure and some

pride adverted to this steady extension, showing that, while so late as the year 1868 the number of matriculated students was only 20, it has during the past five years averaged 66, and that during the last quinquennial period 2 alone of the 104 students have passed out to swell the ranks of the qualified medical practitioners of Bombay. Amongst these, as indeed among their predecessors, there have been many who have most worthily acquitted themselves as students, and become fitted to support the character and dignity of the profession which has admitted them into its membership. The test afforded by the examination instituted by this University before conferring its degree in Medicine is a searching and satisfactory one; and all who succeed in being placed in the first or honour division at their final examination, may fairly be considered to be qualified to take their place in the higher ranks of Medicine.

In commenting upon Dr. Cook's Report, the Director of Public Instruction observes as follows:—

Dr. Cook observes that the College is taxed almost beyond its strength to meet the demands on its teaching capacity, and he looks forward to the day when a College of experimental science, with laboratories fitted for scientific experiment and research, shall be founded in Bombay. But in the meanwhile the need for assistant teachers, especially in Anatomy, is acutely felt. Hardly less essential than the increase of teaching power is the need for enlarged accommodation; and the addition of another wing to the College, and of two extra rooms to the Obstetric Institution, is represented as a pressing want.

Of the 370 students borne on the rolls, 112 are Christians, 143 Parsis, 107 Hindus (including 50 Brahmans and 35 from the trading castes), 3 Jews, and only 5 Mahomedans. All classes of the community, except the cultivators, are fairly represented. Government and Native State officials contribute 50, pensioners 25, merchants 54, and the priestly caste 25. Sons of persons of property are returned at only 12. The wide representation of all classes of the community is a satisfactory feature, and the practical benefits conferred on the community, as illustrated by the large attendance at the College, afford the best justification for the additional accommodation and increase to the teaching power asked for by Dr. Cook.

The Grant Medical College seems to be a well managed and successful institution sufficient with such improvements as the Government of Bombay may make from time to time to meet all the requirements of the higher medical education in the Western Presidency.

20. The Poona College of Science, formerly the Poona Civil Engineering College, arose out of a school established in Poona in 1854 by Government for the purpose of educating subordinates for the Public Works Department.

The College is divided into four departments:—

- (a) Matriculated students studying for University degrees in civil engineering.
- (b) Matriculated students studying scientific agriculture in the College and the farm attached to it.
- (c) Matriculated students who study Forestry.
- (d) Students studying in the College and attached to workshops with the object of becoming overseers, etc.

Attached to the Engineering College are extensive workshops, which have from time to time been extended from the profits made on works executed in them. In these workshops practical instruction is conveyed, and work of various kinds executed for Government and the public. The University of Bombay requires candidates for the L.C.E. degree to perform manual work before the examiners; and this secures for the students in the College a course of practical training noticed as wanting in Madras. The students in the lower or School classes, who become overseers, etc., have to go through a workshop course of from 2nd to 4 years' duration, and it is by them that the work in the shops is chiefly executed. The attending [attendance] at the Engineering College last year was 103, and the Engineering School 67. Regarding the University classes, the following passage is taken from the last Report of the Director of Public Instruction:—

Fourteen students appeared for the L.C.E. Degree, of whom 7 passed—1 in the first class, 1 in the second class, and 5 in the pass class. Twenty-nine students appeared for the F.C.E. Examination, of whom 25 passed—2 in the first class, 11 in the second class, and 12 in the pass class. There was a large number of entries in the Junior Engineering class after the late Matriculation Examination, and several promising students have joined the College from the Province of Mysore. The Bangalore Engineering College has been abolished, and the Mysore State finds it advantageous as well as economical to send pupils here, the State paying to certain selected pupils liberal stipends to enable them to live comfortably in Poona and pay their college fees. The men thus sent are, of course, picked men. I can speak in the highest terms of their intelligence and industry, and their education prior to their joining this College has been most carefully conducted. I believe that somewhat similar arrangements will be made in the Nizam's State, and that, instead of keeping up an Engineering College at Hyderabad, Deccan, a few of the best youths will be selected by the State, sent to this College, and employed by the State on the completion of the course of study. I think the system will be advantageous both to the youths who are thus educated and to the States which will subsequently find them employment. The enlargement of ideas which will necessarily follow a removal from the narrow sphere in which these youths have been accustomed to move cannot fail to produce a beneficial and lasting effect on them. The

pupils of this College first obtained a footing in Mysore nine years ago, and three of its alumni who went to Mysore between the years 1875 and 1876 are now Executive Engineers in charge of districts, and in receipt of salaries of Rs. 400 per mensem.

Two appointments annually to the Engineering Establishments of the Government are guaranteed to this College, which, as far as can be judged, may be pronounced to be on the whole quite abreast of the requirements of the time and place.

BENGAL

21. In six Government* and in two independent Colleges@

Law Schools.

*Hooly, Kihsnaghar,
Dacca, Patna, Rajs-
hahye and Cuttack.
@ Metropolitan Insti-
tution and City College.

649 students are reading Law. Owing to the competition of the independent Colleges, which are situated in Calcutta, the Law Classes in the Presidency College were closed in 1884. This is the first instance of private enterprise in educational matters actually beating the Government out of the field. The number of candidates for the degree of Bachelor of Laws

in the last year reported on was 140, of whom 77 passed. The percentage of successful candidates indicates that the instruction conveyed is fairly satisfactory, and the opportunities afforded for learning Law seem at present to be adequate.

22. Originally the preliminary standard of education qualifying

Medical College,
Calcutta.

for admission to the Medical College was the University Entrance Examination, as it still remains at Madras and Bombay. But about ten years ago the standard was raised from the Entrance to First Arts Examination. The immediate consequence was a great reduction in the number of students. In 1878, when the new standard of preliminary education became familiar, the numbers began to rise again. But then with the object of raising the standard of attainments a new rule was passed that each candidate must pass in every subject, and not merely obtain a certain number of marks on the aggregate of subjects. The enforcement of this rule also brought about a fall in the number of students during the next few years (1879-1882), though probably a decay in the demand for medical practitioners had also some effect. The numbers, however, have

since increased, and now stand at 132, while the standard and professional attainments of the students have been greatly raised.

During 1883-84 female students were admitted to classes for study for M.B. or L.M.S. The question of their admission had been discussed previously; but, owing to the attempt made to allow them admission with a lower preliminary test of general education, the scheme fell through. They are now admitted on equal terms with male students.*

*Female students are admitted on a lower preliminary educational test to the Medical School, which prepares men of the hospital assistant or general practitioner's class.

The course of instruction for M.B. and L.M.S. now extends over five years; and during 1883-84, of 28 candidates for final examination, 10 passed. During 1884-85 a considerable increase in the number of students for medical instruction at the Medical College took place.

In the Medical College School military pupils of the Apothecary class are also educated, and at present the class numbers 60 pupils. This subordinate class has also been thrown open to women, of whom there are now thirteen students attached to the College.

Some women are also instructed in Midwifery in the adjacent Eden Hospital, and pass out annually as qualified *dhais*, or midwives.

23. At the Seebpore College near Calcutta candidates for the degree of Civil Engineering have to go through a four years' course of theoretical training, with which some practical work is combined. During this period they spend three hours daily during term in the carpenter's and pattern shop, smithy, foundry, or fitting shop. Part of the last year's course consists of practical brick-making in the Government brick-fields at Akra; and of practical work in stone masonry, brick-laying, managing workmen, and keeping accounts. Those who are selected for Government employment have to spend another year in the Department without pay as probationers, but they are distinguished students, who are generally in the receipt of Government scholarship.

Besides the collegiate course described above, there are courses for Mechanical Engineers, Civil Overseers, and Mechanical Over-

seers. These courses follow generally the outlines of the course for L.C.E. with appropriate modifications.

Last year the number on the rolls of the College Department was 42; and on the rolls of the Subordinate or Apprentice class 107. The Principal of the College reports that considerable apathy still prevails among the students; but, on the other hand, it is stated that those who have passed through the College or School find little difficulty in getting employment.

NORTH-WESTERN PROVINCES AND OUDH

24. The information available is somewhat meagre: but it is gathered that there are three Schools of Law attached respectively to the Benares, Muir, and Canning Colleges, which are affiliated to the Calcutta University. The Benares Law School was opened in 1884, and consists of 17 students, who defray the whole cost of the lectures. The Law Classes of the Muir College are attended by 31 students, while 57 students attend those of the Canning College at Lucknow.

25. The Thomason Civil Engineering College at Roorkee, founded in 1847 by Mr. Thomason, then Lieutenant-Governor of the North-Western Provinces, and affiliated to the Calcutta University in 1864, was first designed to supply the Department of Public Works and Survey Departments with Assistant Engineers, Overseers, and Sub-Overseers. It is now, however, open to the public. The College contains three classes:—(a) Engineer Class; (b) Upper Subordinate Class; (c) Lower Subordinate Class. The Engineer Class is open to Europeans and Statutory Natives of India, who have passed the Entrance Examination of the University or other similar test. The students go through a two-years' theoretical course, during which they receive practical instruction in surveying and preparing projects. After the two years' course is over, students are eligible for appointment as Engineer apprentices, so far as vacancies are available, and are supposed to undergo a practical training. After being favourably reported on, selected students are appointed Assistant Engineers in the Department of Public Works, four or five appointments of the sort in alternate years being attached to the College. It is stated that some very valuable Engineers have been turned out of this College. Their instruction in surveying is most thorough. They

exhibit great skill in managing native workmen and in applying the resources of the country.

The Upper Subordinate Class also consists of students who have qualified by a preliminary literary test. They have two years' theoretical course in the College, and afterwards one year's practical training. This class includes non-commissioned officers from British regiments, as well as "Natives" of India.

The Lower Subordinate Class are all Natives of India by descent, and a qualifying preliminary education is necessary for admission. Soldiers of the Native Army desirous of learning so much surveying as suffices for reconnoitring purposes are received in this class without previous qualifying education. Generally the courses of study in the principal classes are varied, but include Mathematics, Civil Engineering, Surveying, Drawing, and Urdu, the extent read being of course different in each class. Besides, the Engineer Class learn experimental science and photography. The College also holds examinations and grants certificates of qualification as Sub-Engineer, Overseer, and Examiner of Accounts, Department of Public Works, to all candidates who present themselves, under certain rules. Several valuable stipends and studentships are attached to the College; and the numbers attending the various classes last year were:—

Engineering Class	..	..	..	..	..	21
Upper Subordinate Class	..	..	..	..	..	78
Lower Subordinate Class	..	..	..	..	..	43

There are no Workshops attached to the College; but in the neighbourhood are situated the well known Roorkee Workshops belonging to the Local Government. The students visit these; but they do not perform manual labour there, as at Seebpur and Poona. Their visits, therefore, are practically of little value. It is understood that there is some idea of disposing of these workshops as unnecessary for Government purposes. But preferably it is submitted they should be made over to the College, and a system of practical training added to the theoretical course.

26. Before passing on to Technical Instruction in Schools, the following statement, compiled from the University Calendars, is presented. It shows the number of degrees granted by each

University since its foundation in the three faculties of Law, Medicine, and Engineering:—

Statement showing the number of persons who have taken degrees in Law, Medicine, and Engineering in the Universities of Calcutta, Madras and Bombay.

NUMBER OF PERSONS WHO HAVE TAKEN DEGREES IN												
Names of Universities	Law						Medicine				Engineering	
	D.L.	Honours in Law	B.L.	L.L.B.	L.L.D.	M.L.	M.D.	Honours in Medicine	M.B.	L.M.S.	B.L.E.	L.C.E.
Calcutta .	8	6	1,052	..	262	..	5	8	89	465	27	92
Madras .	..	..	231	..	..	7	5	..	11	29	38	..
Bombay .	1	..	..	131	..	..	2	..	..	170	..	117
Total	9	6	1,283	131	262	7	12	8	100	664	65	209

27. The preceding remarks will have given an idea of the condition of Technical Education of the higher or University character in the various Presidencies which possess colleges, affiliated to a University, in which the higher instruction is imparted. The following observations are concerned with the condition of Technical Education of the lower or school order:—

MADRAS PRESIDENCY

28. In the Report on Public Instruction for 1883-84, the aim of this school is declared to be the development of those industrial arts which have for their end the construction and decoration of the articles, whether of metal, wood, stone, or clay, which are required by the exigencies of modern life in India. The attendance at the school, which in 1883 was 147, rose in 1884 to 162, and it is stated that “a further

advance in strength is expected to take place when the scope of the institution is enlarged, and the services of a competent assistant to the present Superintendent are secured."

The Madras Education Report goes on to speak of the school as follows:—

A pleasing and novel feature in the year's history is that the Institution is beginning to fulfil its chief object—the supply of skilled labour for various arts in districts—some students having obtained suitable employment. The engagement of one as a designer of textile fabrics in a coral firm is specially gratifying, for it is in relation to improved design that the school is calculated to benefit the industries of the country. Instruction in freehand was more successful than that in geometrical drawing, the failure in the latter subject being probably due to the low general educational standard of most of the students.

Useful instruction has been given and progress made in wood-carving, engraving, metal-work, and in the manufacture of stained glass windows, the students having been instructed in the process of execution as well as of design.

The Institution seems to have been very^o active in its manufacturing branch, turning out a quantity of high class work. Experiments too have been made in various directions as regards pottery, and valuable information collected. The discovery of superior kaolin, uncontaminated by iron, near Salem, will, it is hoped, prove an important one.

The expenditure amounted to Rs. 28,261-15-1, and the receipts to Rs. 43,615-5-8.

29. The information of a general or descriptive character avail-

able regarding the Madras mofussil Medical

Medical Schools.

Schools is very scanty; but from the Education reports for the two last years it is gathered that these schools, five in number, are concerned with the training of the Apothecary class. The most flourishing school is that attached to the Madras Medical College. It is attended by 86 students, seven being females, and the progress made is reported to be satisfactory. The attendance at the Medical Schools situated at Royapuram and Nellore show signs of decrease, but the Tanjore and Madura schools were improving. On the whole, the schools, though apparently not very flourishing, seem to serve a useful purpose in Madras.

30. The only Engineering School in the presidency is the Junior

Department of the Civil Engineering College,

Engineering.

to which reference has already been made under the head of University Education. The course of instruction comprises elementary mathematics, engineering, surveying, drawing and estimating, bricklaying, and the Madras vernacular languages.

One scholarship of Rs. 13 per mensem tenable for two years, five scholarships of Rs. 15 and ten of Rs. 10 each tenable for one year are attached to the school, and, besides these, ten studentships of Rs. 10 each per mensem are available for European non-commissioned officers and soldiers who join the school. The institution derives no revenue except from the State. The instruction conveyed in the school is believed to be too theoretical, facilities for practical work being deficient. Still, it is stated, that passed students of the school find no difficulty in getting remunerative employment either under Government or Local Boards or on Railways, and this fact tends to make the school popular and applicants for admission numerous. It is therefore a matter for regret that, owing to insufficient accommodation, all applicants for admission to the school cannot be received. An excellent feature of the organization seems to be a system of examination by which candidates, not being students of the school, appear and obtain on passing examinations certificates of competency as draftsmen and surveyors.

31. There are six Industrial Schools in the presidency, three being situated in Madras, and three in the Industrial Schools. mofussil. The Madras schools, attended by an average of 60 students each, are well spoken of; but the other three seem unimportant. The following description by the Inspector of Schools of the Nazareth Industrial School in Madras, attended by 61 pupils, seems to indicate that as educational institutions, the best of these Industrial Schools is at present of little value;—

In addition to the above articles (chairs, despatch-boxes, etc.) the boys have assisted in making the roofs of six different buildings, and they are being taught to make wheels for country bandies, spinning wheels, and ploughs. Three boys have a fair knowledge of blacksmith's work, and they can make knives for planes, chisels, and nails. It is very desirable to develop this trade and to build a smithy, in connection with which coppersmith's work might perhaps also be carried on.

The tailor boys can (most of them) work the lock-stitch sewing machine. Some of them have recently commenced a little embroidery work in gold and silk thread. I saw them cutting out and stitching ordinary articles of dress, such as short coats, etc., and am glad to say that they worked very neatly.

A new loom has been built for the weaver boys, and there are now five looms at work. There is a good demand and ready sale for the cloths woven here. Cloths of different patterns are being made in this department; some of them are very nice indeed. A machine for winding the yarn has recently been made and is now in use.

Fourteen of the girls learning to make pillow lace are orphans. I learn that specimens of the lace turned out by these girls have been sent to the

Needlework Exhibition held in Madras in connection with the National Indian Association.

32. Madras and Bombay share the distinction of being the only provinces of India which have Schools of Agricultural Schools. Agriculture. India is pre-eminently an agricultural country: the vast mass of the people are agriculturists; the Government derives a third of its revenue from the land; but hitherto only in Madras and Bombay has any effort been made to give instruction in a subject which so intimately concerns the welfare of the Government and the people. Madras has had an Agricultural School for some years, from which, since its establishment, nearly 100 students have passed out. It is stated that the passed students of the school are in request, and that the school is now being regarded as an avenue to remunerative employment. The course of study is varied, consisting in the different classes of arithmetic, book-keeping, geology, physical geography, mechanics, hydrostatics, agriculture, practical farming, surveying, veterinary, and hospital practice. It is stated that Native States and Local Bodies provide stipends for a certain number of students of the school, and that a considerable proportion of the students come of agricultural families. Last year the number of students in the rolls was 95, which is an improvement on the preceding seasons. Judging by the recent examinations, also, the educational attainments of the students are higher than in previous years; and the reports submitted to the Local Government are stated to afford evidence of careful teaching. The least satisfactory feature in connexion with the school is its financial aspect. "The expenditure", says the Education Report for 1884-85, "amounted to Rs. 39,242-5-0, and the receipts from fees, etc., to Rs. 622-14-2. The disproportion is very great, though considerable allowance must be made for a Technical Institution which cannot but be costly, specially during its early days, and until its certificates are of assured value in the competition for remunerative employment. When this condition is secured, it cannot be doubted that fees may be levied at rates which will suffice to cover a large portion of the cost."

33. Such then is the condition of Technical Education in the Madras Presidency at the present time. All told, the students of Technical Colleges and Schools scarcely exceed 1,000 out of a school-going population of about $4\frac{1}{4}$ lakhs. The provision for Technical teaching in Madras is not adequate to the requirements of the case, though the following remarks of the Director of Public

Instruction show that the present state of things in this respect is an improvement on the past:—

During the last quinquennium the number of Technical or Special Institutions has more than doubled, and the attendance has nearly doubled. Under Art and Industrial Institutions, some progress has been made, but not great; but further improvement, extensive and still more intensive, may be expected when the scheme for the development of Technical Education is brought into force, if it receive[s] liberal financial support.

BOMBAY

34. In connexion with the facilities afforded in the Bombay The Poona Engineering School. Presidency for Technical training in schools, it may be well to begin with the junior or school department of the Poona College of Science, on which some remarks have already been made in connexion with University education. The following passage, extracted from the last Education Report of the Bombay Presidency, sets forth the present state of things in regard to Engineering and Agricultural Classes, and besides indicates what are Mr. Lee-Warner's opinions on the broad question of Technical training:—

The average number on the roll (of the Workshop and Sub-Overseer class) throughout the year was 77, with an average daily attendance of 62. The number of apprentices in the workshops at the close of the official year was 67, of castes and creeds as follows:—

11 Christians .	{ Europeans	2
	{ Eurasians	2
	{ Portuguese	7
51 Hindus	{ Brahmans	35
	{ Artizans	11
	{ Parbhus	3
	{ Others	2
Mahomedan		1
Jews		3
Parsi		1

This shows an increase of twelve on last year's attendance, and I am glad to report that the artizan class is better represented in the above table than it has been in any previous year.

Thirteen apprentices completed their workshop course during the year. Of these, three left and obtained employment, while ten presented themselves in December last for the Entrance Examination of the Sub-Overseer class. All passed the Entrance test, and are now studying in the college for the Sub-Overseer's examination which will be held in January 1886.

The Sub-Overseer class at the close of the year consisted of 15 students—an increase of one on the total of the previous year.

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Eight candidates were declared by the examiners to have passed the examination, and most of these have since obtained employment.

The Principal dwells on the urgent need for adding to the staff of the workshop a foreman moulder, a pattern-maker, and other teachers of trades. The carpenter's shed also requires additions. Owing to the late pressure on the finances, these proposals have not yet received the sanction of Government; but I take the opportunity of pointing out the advantage of developing to the fullest extent the only higher class institution in the presidency which attempts to give mechanical training. We have abundant reasons for perseverance. The Native State of Mysore and other Feudatory States of India send pupils to the Poona College of Science, and *Brahmin pupils are showing a readiness to turn their hands to carpentering. There is thus a full supply of teachable material.* On the other side, the need for enlarging our present system of education and for giving it a more practical turn strikes me as the greatest need of the times. We have too many pupils turned out with a smattering of that class of education which aims at a University career. The notion that the education of the mind and the education of the hands are distinct and even contradictory prevails too widely in India. *A revolution in this state of popular feeling would be effected by the institution of Technical schools alongside of the ordinary Literary school for the practical instruction of those who must earn their living by the work of their hands. If this want is ever to be met, the first need is an outturn of skilled and well trained teachers and foremen.* The Poona College, if properly fostered by Government, appears to me capable of laying the foundation of a great reform. If young Brahmin lads, who are fitted to be masters of our higher primary and our secondary schools, will only go through a course of mechanical instruction in the workshops, whilst they acquire a theoretical knowledge of various crafts in the lecture-room of the Poona College, we shall have solved the first of our difficulties, namely, the provision of competent teachers. We can then institute schools after the model of that at Rotterdam, which has been introduced into other parts of the Continent. The school there is on the half-time system, the morning being devoted to mental education, the afternoon to practical teaching in the workshop, and the course extends from the age of 13 to 16. The pupils learn drawing, mathematics, physics, chemistry, and the elements of various trades, the best practical workmen being engaged to teach these trades. *It appears to me that any enterprising municipality, which is the centre of various trades, would do well to institute a school of this sort in place of the uniform Lower Anglo-Vernacular School which is copied everywhere. But, in the first place, teachers are wanted, and I would gladly see the workshops of the Poona College largely increased and the institution recognized as in part a sort of Technical Training College for teachers of a new class of Technical Secondary schools of which every district should have one.*

The Poona College is perhaps too ambitious, but in our present experimental stage that is inevitable. Some attempt has been made in this presidency to give a practical turn to our higher education by the creation of agricultural classes in High Schools. The programme which I have sketched above for a course of mechanical instruction is already realized to some measure in regard to agriculture. The class at the college consisted of 46 pupils studying agriculture, of whom 8 passed. It is proposed that the University should establish a degree or license in agriculture, which would open to the successful candidates certain revenue appointments at present reserved for graduates of the University. Meanwhile employment for the passed students is found partly in the department under the Director of Agriculture, and partly in the schools to which an agricultural class is attached.

The various castes and classes of the community are very fairly represented in the college. Brahmins as usual contribute the largest quota, *viz.*, 142 out of 235 on the rolls. Other Hindus number 48, Christians 29, Parsis 11, Jews 4, and of Mahomedans there is only one. There are 17 sons of cultivators, and 26 sons of persons of means. Government officials contribute 63 to the attendance; but almost every class of the community is represented in one department of the college.

35. An Engineering Class has been started in connexion with this School, the attendance last year being 21. The progress made has not yet been very encouraging, the students especially showing but little aptitude in practical levelling and surveying. Steps are being taken to improve matters, and it is to be hoped that this very interesting experiment to graft on Technical training to the High School system will be persevered with. The teaching staff at the School seems to be weak.

36. The next institution for Technical instruction in the Bombay Presidency, to which attention may be called, is the Sir Jamsetji Jijibhai School of Art, in regard to which Mr. Lee-Warner in his Education Report for last year speaks thus:—

The attendance returns for the last three years are:—

	Number on the rolls at the end of the year	Fee receipts
1882-83	184	1,796
1883-84	212	2,149
1884-85	251	2,349

The following table indicates the subjects of instruction in the school, and also the distribution of the pupils through the various classes:—

	1883	1884	1885
Elementary School	158	179	209
Architectural Drawing Class	21	15	23
Painting Atelier	12	23	18
Sculpture Atelier	9	8	8
Wood-engraving Department	5	2	..
Pottery Department	16	Nil	..

The returns for the grade examinations for the last three years are as under:—

	1st Grade		2nd Grade		3rd Grade		Total	
	Pre-sent-ed	Pas-sed	Pre-sent-ed	Pas-sed	Pre-sent-ed	Pas-sed	Pre-sent-ed	Pas-sed
1882-83	343	92	75	44	9	3	427	139
1883-84	463	159	75	24	24	4	562	187
1884-85	507	151	77	42	23	8	607	201

The statistics show the continued extension of the influence of the School of Art over High Schools, not merely in the presidency, but even outside its limits. The figures are at first sight misleading without fuller explanation. Two classes of candidates are included in the above table,—those educated in the Bombay School of Art, and those educated elsewhere but brought under the test of its examinations. The larger figures given in the second table above include candidates from the mofussil Middle Class Schools. With a view to introducing drawing more generally into the school course, Government laid down in January 1880 a course of instruction called the 1st grade art, which included freehand drawing, model and object drawing, and practical geometry. For more advanced students, a 2nd grade Arts course was prescribed, including the subjects given above, and linear perspective and delineation of diagrams on the blackboard. The time has now come when the standard may fitly be raised, as prizes are awarded to all who pass the standard of excellence prescribed. It is very satisfactory to note that under the stimulus of these small prizes, and in consequence of the facilities afforded by the supply of teachers sent out from the School of Art, no less than 33 schools, besides the School of Art, supplied competitors. A few of these were aided schools, and some were schools outside the presidency, such as the Nagpur Normal School, the Bhuj and Rajkot Schools of Art, the Kolhapur and Baroda School, and the Amraoti High School. The value of the addition of drawing, and of the facilities offered for teaching and examining it

by this Department, are thus recognized, not only in the Native States, but in the Berars and the Central Provinces. I hope that in time these States will contribute their share to the cost of the examination and of the prizes; but meanwhile, beyond raising the standard, I have taken no steps to check the widest distribution of this small attempt at introducing a demand for some accomplishment not directly connected with the University degree course.

Returning from this explanation to the figures showing the work done in the School of Art, I notice that the examiners report a slight improvement in the freehand drawing of the elementary schools, while in model drawing the high standard attained last year has been maintained. The drawings in geometry were considered to show the conspicuous care devoted to instruction in this subject, and the work in perspective was pronounced exceptionally good. In the works submitted, showing outline of ornament in low relief from the cast, a decided improvement was observed; but in foliage drawn from nature there was a slight advance noticed in the work of the year. In the sculpture atelier a falling off was observed. In the architectural drawing class there were 23 students, of whom the lecturer, Mr. Adams, reports that they have made very great progress both as draughtsmen and in the knowledge of architecture.

I attach great importance to a scrutiny of the various classes and castes which attend the different classes of institution. The conspicuous absence of Mahomedans and the paucity of Christians in the Arts Colleges and even in the High Schools afford indications that what may be called the University course does not attract these classes of Indian society. It is therefore satisfactory to notice that in the School of Art the overwhelming preponderance of a single caste, which has been observed in the Colleges, does not exist. The average daily attendance in the School of Art has been 148, but altogether 378 students attended the School at one time or another during the year. Of these, 200 were Hindus, 53 being sons of artisans, 24 the sons of cultivators, and only 52 Brahmins. There were 14 Mahomedans, 83 Parsis, 68 Christians, and 13 Jews. Of the Christians, 28 were Europeans, 5 Eurasians, 34 Portuguese, and one a Native convert. This distribution is satisfactory, as showing that the school meets a need in all classes of society, and the instruction it affords in the technic art of architecture and the phonetic arts of sculpture and painting may be expected to produce a widespread influence in the future.

37. The tabular statement presented in paragraph 12[13] of this Note will have shown that Bombay alone of Indian provinces has in any way anticipated the bifurcation of studies commended by the Education Commission by introducing Agricultural and Art classes into High Schools. In connection with the High Schools at the places noted in the margin, Model Farms have been established, and Agricultural classes designed for the children of agriculturists, who are encouraged by scholarships of the value of Rs. 4 a month to attend the Model Farms for instruction in practical agriculture. The course includes chemistry, physics, botany, physical geography, and geology; besides which the

High School Classes
in Agriculture and
Drawing.

Dhulia, Ahmednagar,
Belgaum, Nasik, Sholapur,
Surat, Hyderabad
(Sind) and Nadiad.

student may take up land surveying and physiology. The following observations of the Director of Public Instruction in his last report will show what is being done in this direction:—

The review of the work done in the Agricultural classes would more conveniently follow the remarks given on the College of Science. It is through the supply of the teaching material prepared in the College of Science that it became possible to graft instruction in agriculture on the High School's course. There is a small but steady improvement in the results attained from year to year. That we have not attained larger results is due in some measure to the want of adherence to the scheme sketched out by His Excellency Sir Richard Temple. Original designs are apt to be forgotten when the construction is completed, and therefore it will not be out of place to recall attention in the design prepared in 1878. It was expected that the University would give a degree in Agriculture; and that the students attending the Agricultural classes of the College of Science would partly be studying for a University degree, involving a course of three years' study, and partly aiming at a College certificate to be given after two years' study in the College. During the past year some advance was made in laying before the University a scheme for a degree in Agriculture. The subject is still under their consideration; but I am inclined to think that the first essential to that result has not yet been fulfilled, namely, the addition of a Model Farm to the College of Science. In regard to the second part of the scheme, the College certificates have gained a marketable value from two causes—first, certificated masters are thus rendered available for the High School classes; and, secondly, the creation of an Agricultural Department has directed the attention of those who are entrusted with its patronage to the High School classes. The High School classes were intended to be special classes of the ordinary High School in which education in agricultural chemistry, in botany, and in surface geology might be given to boys willing to receive it, who would be excused certain lessons in the ordinary course. According to this plan, the boys thus learn something in school about crops, manure, soils, stock, and implements, whilst attached to the school is a small farm in which they may practise the principles acquired in the school-room.

38. Notwithstanding that the attendance at the Drawing classes is voluntary, already 2,713 pupils are under instruction. The classes are attached to Government schools alone, but students of other schools are encouraged to attend them. Certificates of two grades are given; and schoolmasters who hold the qualifying certificates and teach drawing in their own schools receive an additional grant. On the subject of drawing classes, Mr. Lee-Warner has the following remarks:—

Five new drawing classes were started and one closed during the year under report, and the number of children taught is increased from 2,234 to 2,713.

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The new classes were opened as follows: two in Aided schools, one in a Government school in Sind, another in the High School at Baroda, and the fifth in the Amraoti High School in the Berars. When it is borne in mind that the change in our system was only commenced in 1880, and that in the first year of its operation but one school outside the city of Bombay joined in the scheme, then its extension to Amraoti, Baroda, and Nagpur in the interval of four years may be regarded as an encouragement to those who desire to introduce into our Secondary Schools a more, varied type of instruction than that which obtains marks in the University Examination.

Later on something will be said on the desirability of making drawing an obligatory subject in all Middle and High Schools, if we cannot at present go lower down. The importance of drawing as an essential requisite for and introduction to all systems of Technical training has been greatly accentuated by the recently published Report of the Royal (English) Commissioners in Technical Instruction.

39. It remains to state the condition of things in Bombay in regard to Medical and Industrial Schools. Omitting mention of the Subordinate Medical School attached to the Grant College, the Medical Schools are three in number—one at Poona, one at Ahmedabad, and one at Hyderabad (in Sind). The following remarks taken from the Director's Report indicate that, while there is room for improvement as far as the attendance at these Schools is concerned, the general prospects are not discouraging in this very important branch of Technical training:—

The attendance in the Byramji Jijibhai School at Poona has fallen from 57 to 52, while that at Ahmedabad has risen from 52 to 63. The attendance in the Hyderabad School has also risen from 38 to 49. At the Poona School 9 pupils passed in the first year's course and 12 in the second year's course at each examination, while at the final examination of pupils in their third year 22 passed. Amongst the students are three Mahomedans. Dr. Cook reports that the general conduct of the pupils was on the whole good.

The Ahmedabad School has entered upon its sixth year, and at the closing examination 13 passed out, 16 passed in the second year and 20 in the first year's course. Dr. Robb writes in high terms both of the conduct and of the progress of the pupils. The year under review was the first year in which the Hyderabad Medical School, opened in July 1881, submitted its pupils to the test of the final examination. The pupils consist of native medical pupils and High School pupils, and the object in view is to provide the province, isolated as it is from the rest of the Bombay Presidency, with qualified practitioners, as well as to recruit the local Subordinate Medical Service with suitable candidates. Eight High School pupils and eight native medical pupils passed the final examination. Surgeon-Major Keelan draws attention to the urgent need for increased accommodation for the school.

40. Excluding the David Sassoon Reformatory, with its 215 inmates (who are partly convicts, partly free Bombay Industrial School students), the chief Industrial Schools in Bombay are those at Ratnagiri and Byculla, in regard to which the Director reports as follows:—

The School of Industry at Ratnagiri was established by the orders of Government, dated March 25th, 1879. In 1863 a school was started on a private basis, unconnected with Government, which developed into a Saw Mills Company, but failed in the share mania. The building, plant, etc., of the old Company was offered in 1879 for Rs. 25,000, and the Local Funds Committee purchased it. Thus originated the Industrial School, which is under the management of a Local Committee. It turns out annually a number of lads of the artizan and labouring classes, who are well instructed in useful mechanical arts, and whose woodwork has gained favourable notice at the Exhibitions at Poona and elsewhere. The Educational Department has no concern with the management of the workshops, and is merely interested in the education of the lads. During the past year there were 92 boys in the school against 91 in the preceding year. The results of the examination showed very satisfactory exercises in drawing, but in other respects the Inspector remarks that "the boys have been pushed on rather faster than is good for sound progress."

The history of the Byculla institution further illustrates the difficulties attending the extension of Technical education. In 1879 the Council of Directors of the Education Society recommended an alteration in the course of instruction with a view to preparing boys for the mechanical trades. Certain boys on attaining the age of 16 were to be put to work in workshops, and boarded in the Society's Apprentices' Home until they had qualified for suitable situations as mechanics. Government were asked for a grant of Rs. 20 a month for each boy above 10 in number and under 40, and the Society undertook to admit boys of good character from other schools when there was room for them in the Home. Government sanctioned these proposals in Government Resolution No. 918, dated July 24th, 1880. In December of the following year the Society, finding that the number of apprentices did not correspond with their expectations, asked for a modification of their original proposal. They applied for allowances for three-fourths of the boys in the Home instead of only for those in excess of the number, 10. Government in their Resolution No. 533, dated April 11th, 1882, fixed a grant of Rs. 10 a month for 3 years for three-fourths of the whole number of inmates of the Home. As the employers would not execute indentures, regular attendance at the workshops was made a condition of payment of the grant. Government also expressed their expectation that the Society would give suitable education out of work hours. The year under report was the closing year of the above arrangement. There were 24 youths in the Home, four of whom came from other schools. They were employed in the workshops of the Great Indian Peninsula Railway Company, the Docks, and the Port Trust Committee, and their progress is reported as satisfactory. The want of a drawing master is, however, represented by the Educational Inspector.

There are three other Industrial Schools in the Bombay Presidency, but they are small and of no marked educational importance

at the present time. It is the hope of the Officiating Director of Public Instruction, Mr. Lee-Warner, that in course of time Municipal Boards will distribute a net-work of Industrial Schools over the presidency, and he advocates the concession of liberal grants-in-aid by Government in support of such institutions. These remarks indicate a line of policy which should not be lost sight of.

BENGAL

41. For the higher professional training in Law and Medicine, Bengal is well equipped. The law possesses great attractions for the Bengali mind, and the law classes in the various colleges are well filled. The Calcutta Medical College is also a flourishing institution, in no need of special aid or encouragement from Government. The Engineering College at Sibpur, near Calcutta, has made progress; but it may be doubted whether it has yet established itself as a popular Educational Institution. It is at present isolated, with no Technical Schools of a preparatory sort leading up to. This is a defect not peculiar to Bengal, which it is understood to be His Excellency's wish to remedy.

42. The first institution for Technical training of lower than collegiate rank to which attention is invited is the Calcutta School of Art, regarding which the following remarks occur in the last Bengal Education Report:—

The number of students on the roll continues to increase. There were 157 at the close of last year, against 139 in 1883-84, and 96 in 1882-83. The subjects taught continue to be the same, and the same standard of excellence is maintained. A very high standard in each stage has now been firmly established, and is well worked up to. It is the opinion of competent authorities that the students' work will stand well in comparison with that of any School of Art in England or elsewhere.

The lithographic class is still employed upon the plates for Dr. King's great work on the Indian order Ficaceae, and the Committee for the Exhibition to be held in London next year have sought the assistance of the school for—

- (1) a collection of work illustrating the various stages of instruction forming the school course;
- (2) works in metal *repoussé*;
- (3) wood-carving;
- (4) designs for Monghyr slate works;
- (5) designs for pottery;

The Principal anticipates that the school will acquit itself creditably in all these matters. He speaks in high terms of his staff of assistants, who are all natives and old students of the school, and particularly of Baboo Annada Prosad Bagchi, the head-master.

The receipts from fees were Rs. 3,406 against Rs. 2,803 in the previous year, and the expenditure was Rs. 22,642 against Rs. 18,109.

It may be noted here that the Government of India has recently recommended to the Secretary of State a proposal for strengthening the teaching staff of the Calcutta School of Art, and placing it under the control of a thoroughly competent Principal, to be engaged in England. It is understood to be the intention of the Bengal Government to strengthen and develop the demand for Art education by establishing, as time goes on, subsidiary schools in the chief cities and centres of the interior.

43. Besides the Medical School attached to Medical College, in which instruction is conveyed through the medium of the English language, there are four medical schools in Bengal,* in which instruction is being imparted in the vernacular. When the preliminary standard of education was raised for candidates for medical degrees and licenses in the

*At Sealdah, Dacca, Patna and Cuttack.

Medical College, a more satisfactory guarantee of preliminary education was required also from candidates for admission into the vernacular schools. In consequence probably of this the number of students in the vernacular schools fell during 1877-78 from 862 in the previous year to 686. During 1879 the system of education of this class of medical subordinates was revised. Passed students of these vernacular schools were intended to be (a) Hospital Assistants and not independent practitioners until they had received additional instruction at some hospital for at least two additional years, when they might, if considered fit for it, be appointed to small places where the services of an Assistant Surgeon could not be afforded; and (b) village practitioners, who should in poor villages supplant baidis, hakims, and kobirajes. The education these men were receiving became too theoretical for these purposes; and with a view to rectifying this, as well as other imperfections in the existing system of their education, it was decided (a) to limit the numbers taught; (b) to raise the standard of preliminary education; (c) to simplify the lectures, making them more tutorial; (d) to make the periodical examinations more frequent; and (e) to make the training more practical. These measures are said to have been attained by greater proficiency in the candidates who pass out of

these schools. During 1882-83, owing to the abolition of the school at Nagpur, Central Provinces students were transferred to Bankipore. During 1883-84 the following numbers obtained diplomas at these schools:—

Campbell (Sealdah) Medical School, 37 out of 47 candidates.

Dacca Medical School, 33 out of 40 candidates.

Temple (Patna) Medical School, 23 out of 34 candidates.

Cuttack Medical School, 9 out of 9 candidates.

During 1882-83 a Homoeopathic School independent of Government was started at Dacca, and 46 pupils attended it. In the following year 144 attended, and during 1884-85 a second Homoeopathic School was started.

44. The Bengal Education Report for last year shows five Industrial and four Survey Schools attended by Industrial Schools. 172 and 171 students respectively. Only three of the Industrial Schools at present seem to subserve any useful educational purpose; and among these three the only school which is a really promising institution is the Industrial School at Mahisadul in the Midnapur District, which the public-spirited local zemindars have founded and endowed. This school is popular, having 68 students in the first year of its existence. Carpentry is the chief industry taught.

The Survey Schools at Dacca, Patna, and Cuttack are well spoken of; and the course of training, comprising as it does instruction in the rudiments of engineering, road and bridge building, etc., is declared to be as practical as can be desired at present. It is stated that, as a rule, passed students of these schools find little difficulty in obtaining employment.

On the whole, however, Industrial Schools in Bengal are at present mere excrescences on the educational system, formed on no plan, and having no well-defined object in view.

PUNJAB

45. The latest information available regarding the Lahore School of Law is contained in the following passage from the Punjab Education Report for 1884-85:—

The Law School, which is maintained by the University, sends us no report. It appears from the statistics, which are now for the first time included in our returns, that it had on its rolls at the end of this year 71

students, and that the cost of maintenance was Rs. 4,572. The income derived from fees was Rs. 3,670; and this, added to the fees for Law examinations, I understand do more than cover the whole University expenditure upon teaching and examining in law.

The school passed nine out of 37 candidates for the first, and 5 out of 24 for the final examination; these results being very markedly better than those obtained by private tuition, and than the corresponding results of last year. During this year the rules for the management of the school and constitution of the examinations in law have been revised. An Honour examination has been added, and the educational qualifications required for admission to the examination have been raised. At the same time the Chief Court has raised the standard of the University examinations required of candidates for admission to the local bar; and the result can hardly fail to be advantageous to the profession, though it may perhaps reduce the number of students in the Law School.

46. The Lahore Medical School consists of two departments—
 an Upper, in which the students are instructed through the medium of English during a course of five years, when they may obtain a diploma as Licentiate in Medicine and become eligible for employment under Government as Assistant Surgeons; and a Lower, in which students are taught in Urdu to the standard of Hospital Assistant requirements in a course of three years. The admission of women to the classes has been sanctioned, and last year—the first of the experiment—11 female students, 8 of whom only spoke the vernacular, were attending the school.

The preliminary standard of education for students entering the Upper Division is not so high as it is in the Medical College, Calcutta, the Entrance Examination standard being accepted. Up to 1879, 76 Assistant Surgeons had entered Government service from this school. Last year there were 77 students in this Upper Division.

The Lower Division or Vernacular class comprised—

- (a) those selected by Government to become hospital assistants, and who had passed a year previously in regimental hospitals;
- (b) those educated by local funds to become native doctors at civil dispensaries;
- (c) hakims or their relatives.

In 1880 a new class was formed of civil medical pupils to be trained as hospital assistants for civil dispensaries, who were required to have a sufficient knowledge of English to be taught in that language. During 1883-84 there were 82 pupils in this Lower Division.

There is also a midwife class, the pupils attached to which attend weekly lectures given by medical officers attached to the school. Their services are held in high estimation by the native population.

Dhai class.

Measures have recently been sanctioned by the Secretary of State to increase the teaching power of this school; and it is to be hoped that degrees in Medicine will in course of time be conferred.

47. The Mayo School of Art at Lahore is intended to train craftsmen in the higher and more artistic branches of their crafts, more especially in the principles of design, and to exercise a general influence over the more artistic industries of the province by acting as an aesthetic centre, a school of design, and a source of enlightened criticism and advice.

School of Art.

The following is the curriculum pursued in the school:—

All students, without exception, are required to pass through the following Elementary Course:—

- (1) Blackboard Demonstrations of Free-hand Drawing and Outline from the Flat.
- (2) Elementary Geometry.
- (3) Outline from the Round.
- (4) Rudiments of Perspective (Model Drawing).
- (5) Light and Shade from the Round.
- (6) Plant Drawing from Nature.
- (7) Elementary Studies of Colour.

This course will be succeeded by more advanced and technical instruction suited to the aptitude and inclination of the students. The following are the chief subjects taught:—

- (1) Architectural Drawing and Design suitable for Mistries and Draughtsmen.
- (2) Advanced Perspective.
- (3) Wood Construction and Ornamentation, as Wood-Carving, Cabinet-Work, etc.
- (4) Modelling in Clay and Moulding in Plaster; Architectural details for Terracotta, Stone Carving, etc.
- (5) Modelling from Nature.
- (6) Painting in Oil, Water-Colour, and Distemper.
- (7) Lithographic Drawing.

(8) Engraving on Wood and Metal.

(9) Textile Design, as Carpets, Embroideries, etc.

In all architectural and decorative work the principles of Oriental design are considered of the first importance.

The following extracts from the last report of Mr. Kipling, the Principal of the School, will serve to indicate the character of the teaching pursued in the school:—

The bulk of our students continues to be drawn from the artizan classes; and to many of them the two hours' daily instruction received by the junior classes in reading, writing, and arithmetic from the school Maulvie is of great value.

Of the youths sent up by Municipalities and District Boards, some are progressing favourably, but others have come up too young. In cases where such bodies employ draughtsmen, it might be worth their while to send them to the school for instruction in design, carpentry, etc.

The following Municipalities and District Funds provide stipends for the maintenance of youths sent by them for instruction: Amritsar Municipality, 2 students, Rs. 10 and Rs. 5 per mensem; Kasur, 2 at Rs. 5; Jhang, 1 at Rs. 5; Gujranwala District Fund, 1 at Rs. 5; Jullundur District Fund, 1 at Rs. 6; Gujrat District Fund, 1 at Rs. 6; Sialkot, 1 at Rs. 5; and the Nabha State, 2 at Rs. 11 each.

The most important work of the year and the most complete in point of accomplishment was the drawing done for the illustration of the Journal of Indian Art, including architecture, Mooltan pottery, ivory-carving, and other subjects. Drawings were also made for carpets, screens in carved wood, for choice examples of Koft work, Hoshiarpur inlay and wood-work, most of the latter being given out for execution to artizans in the districts for exhibition at the Indo-Colonial display in London. The most important piece of original design was the billiard-room for His Royal Highness the Duke of Connaught at Bagshot Park. This was begun by Ram Singh and myself during the last vacation; and we succeeded in satisfying our patrons with a project for lining the new billiard-room with an elaborate arrangement of carved wood in the style of the last century of Punjab wood decoration. These designs and drawings, though chiefly the work of myself and Ram Singh, Assistant Master, were worked upon by the younger students, who made full size experimental drawings, models, etc.—perhaps the most instructive practice that can be found. The actual work is too large and heavy to be undertaken in the school, and it is given out on contract to a carpenter at Amritsar who works under the direction of Ram Singh; while some of the choicer panels, etc., are reserved for the practice of the wood-carving class in the school. In addition to the lining of the billiard-room, all the furniture for the apartment was designed in the school, so as to be in keeping with the rest. In a similar way the design for a carved screen, the gift of the Punjab Government to the Indian Institute at Oxford, was elaborated in the school on lines suggested by Mr. Basil Champneys, the Architect of the Institute, and actually carried out at Amritsar.

This school is capable of doing a great deal to rescue the art of Northern India from forgetfulness and corruption; but, like the similar schools in Bengal, it is now isolated, and owing to this isolation incapable of producing the full effect in the arts and industries of the province which under better arrangements might be produced. The number of students has risen from 33 in 1882 to 185 last year, and it is probable that the numbers would be even larger had the Principal's attention not been diverted to some extent from his proper duties by preparation for the Colonial Exhibition; still much good is in an indirect way done by such preparations. "It cannot be denied," says Mr. Kipling, "that the searching out and bringing forward of the great industrial and artistic capabilities of the province is of some use to the school, in that it brings us into contact with the best workmen, and gives that practical turn to our work which is so easily missed in theoretic teaching. The examples of Oriental design in the forms of engravings, photographs, books, and our own drawings and casts that are gradually accumulating are of great use to artizans who come up from time to time to take instructions for special objects."

48. There are four Industrial Schools attended by 93 students in the Punjab; but the schools seem worthless for any practical purpose, and the Director of Public Instruction is disposed to close them. He says they "have a tendency to degenerate either into charitable institutions or into factories supported by public funds. They do not introduce improved methods or special skill. The technical instruction they impart can be better obtained in local workshops, while the general instruction can be more effectively and more cheaply given in night schools."

This testimony is not very encouraging as to the immediate future of industrial training in the Punjab. But the complaint has been heard in other provinces also; and later on some remarks will be offered both as to the source of the difficulty and as to its remedy.

NORTH-WESTERN PROVINCES AND OUDH

49. Under University Education, reference has already been made to the Law classes in the Benares, Muir, and Canning Colleges, and to the Engineering College at Roorkee.

There is no School of Art in the United Provinces which are [is] so full of artistic industries; and this is a defect which should assuredly be remedied.

There is no institution for imparting the higher education in Medicine; but the Agra Medical School instructs pupils up to the standard of Hospital Assistants.

Four classes of students attend this School:—

- (a) Military students who have already passed one year in regimental hospitals.
- (b) Civil students of the North-Western Provinces.
- (c) Civil students for Rajputana.
- (d) Private pupils.

The course of instruction extends over three years. The civil students (b) are admitted upon passing the Anglo-Vernacular examination or the modified Anglo-Vernacular examination. The former preliminary examination was found to be too severe a test; but those who enter through the modified preliminary examination upon passing out of the school obtain the lower rate of pay given to Hospital Assistants. The School is doing very good work, and appears to turn out a sufficient number of qualified men to meet the demand.

49a. The Imperial Forest School intended for the technical training of Executive Forest Officers was established in 1878 as a provincial institution, though students from all provinces were admitted. The first theoretical course was held in 1881, when 30 students, arranged in two classes, attended lectures on forestry, botany, forest law, natural science, mathematics, and surveying.

Since then the arrangements have been considerably improved, and the school has been converted into an Imperial establishment, and placed under the Inspector General of Forests.

The Director of the Forest School is at the same time Conservator of the School Forests, and thus maintains a direct connection with the management of the forests in which the practical teaching is carried on.

The school was originally established for the professional training of Foresters and Forest Rangers for the Indian Forest Department. It is now, however, open to Forest candidates sent by Native States and to the public.

The school contains two classes—one for Rangers, taught in English; the other for Foresters, where Hindustani is the medium of instruction.

The Rangers class is open to statutory natives of India, who have passed the Entrance Examination of the University or other similar test.

The students go through a course extending over 18 to 21 months, divided into two terms of purely theoretical teaching, and two terms of instruction in the forests.

The first theoretical term comprises mathematics, morphological and physiological botany, and other auxiliary sciences; the out-door term following comprises surveying and general instruction in the forest; the second theoretical term includes forestry in all its branches, including the protection of forests against injuries and diseases, systematic botany, forest law, geology and knowledge of soils, and the drawing and preparation of estimates for roads, slides, and other forest works. During the last term valuation surveys and forest organization are taught in the forest.

The vernacular class is more elementary.

The Forest School grants certificates for Forest Rangers and for Foresters; also certificates of having passed in surveying by the lower and higher standard.

The school has proved useful, and has even during the short time of its existence turned out several able Forest Officers.

During the last term the school was attended by 63 students, including 11 from Madras, 7 from Native States, and 4 private pupils. Of these, 50 attended the Rangers' class and 10 that for Foresters.

50. There are no Survey and only two Industrial Schools in the Province. These Schools, situated at Gorakhpur and Benares, are orphanages for Native Christian children under the charge of missionaries. It is gathered from the accounts given of them that they subserve no purpose of general Technical training, even in their immediate neighbourhood.

On the whole, then, it may be said that there is room for improvement in all branches of Technical training in the North-western Provinces and Oudh.

BURMA

51. Until 1883 there seems to have been in Burma no institution for training in Law, as there is still none for instruction in Medicine or Engineering. In that year, however, the Rangoon College was affiliated in Arts to the Calcutta University, and a chair of Law seems to have been established. The lectures, however, are as yet not recognized by the University; and as the School is only in its infancy, no further reference to it is here necessary. The following extract from the last Report of the Director of Public Instruction will show precisely the position of Technical instruction in the province:—

In addition to the apprentice school conducted in connection with the State Railway Workshop at Insein, I have to notice the opening of a special industrial branch of the Municipal High School at Akyab under Mr. J. Simeon, which has good promise of success.

The Aided Mission Schools under Mr. Nichols at Bassein, Mr. Bunker at Toungoo, Mr. D'Cruz at Bassein, and Mr. Vinton at Rangoon have also for years made carpentry, printing, weaving, book-binding, and other industrial arts part of their course of teaching; printing presses are attached to the Society for the Propagation of the Gospel and Roman Catholic schools at Toungoo; and the Management of St. Paul's School at Rangoon proposes to inaugurate a system of Industrial teaching in their new buildings.

These special schools are designed primarily for the training of Thugyis (or subordinate Revenue Officers), and the regulations under which they are conducted have been again revised in the past year. The revised rules are appended to this report.

From these rules it will be seen that Survey schools are for the present to be conducted in five districts, and that they will be from time to time opened in such places and under such superintendence as the Chief Commissioner may direct.

In the past year Survey schools have been maintained at Akyab, Rangoon, Bassein, Henzada, and Pegu, the school at the last-named place being opened only in January last.

The schools are under the general superintendence of District Officers, and no special reports on their working have been received excepting from Akyab.

From the statistical returns forwarded by the Educational Syndicate and by the Survey teachers, it appears that a total of 41 students succeeded during the year in passing the provincial examination in surveying. Of these, 16 were pupils of the Henzada Survey School and 14 of the Hanthawaddy school.

The Bassein school passed five, and the Akyab school nine. The Pegu school has not yet presented candidates.

Of the great usefulness of these special schools, both in the interests of the public service and of the pupils of our schools, there can be no doubt.

It will be fitting to notice here the working of the special measures adopted by the Government for preparing the youth of indigenous races for the professions of Medicine and of Engineering.

As regards Medical instruction, the practical experiment made some years ago by the institution of classes at district head-quarters conducted by Civil Surgeons showed that it was still premature to inaugurate any local system of Medical teaching, and the plan was adopted in 1881 of selecting yearly a limited number of picked scholars to be sent for training to the Government Medical College at Calcutta.

The allowances made to these scholars are very liberal, and an assured prospect of future employment in the province is held out to them.

It was necessary, at the outset, to obtain from the Bengal Government special leave for the admission to the College of scholars not fully qualified by the regulations of the University; but the number of local candidates passing into the University having increased, there is now no difficulty in selecting fully qualified scholars. At the present time seven scholars from the province are attending the Calcutta Medical College.

The general progress of the students is reported to have been good, though it is doubtful whether the scholars first appointed will be able fully to qualify for the grade of Assistant Surgeon.

The course of training occupies five years, and the ultimate success of the plan has yet to be seen. But there seems every reason to think that the plan is a sound one, and preferable to any hasty attempt to force Medical education in the province before the time.

A similar and subsidiary scheme of Medical education has now been adopted, whereby a fixed number of Burmese scholars are selected annually to be sent to Madras for training as Hospital Assistants.

Six such scholars are now at work in Madras, and the reports of their conduct and work are very encouraging.

Lastly, there has been correspondence in the past year on the subject of offering facilities for the Medical education of women in accordance with regulations lately introduced in the Calcutta Medical College. The subject, which is an important one, is still under consideration.

For the encouragement of the study of Engineering among the best educated youth of the province, a system of scholarships, not less liberal than the Medical scholarships and tenable at the Government Engineering College, Calcutta, has been in operation since 1881.

Four Engineering scholars are now attached to the Calcutta College; and will ultimately be attached to the Public Works Department in the province.

All the special scholarships here noticed are open exclusively to candidates of Burmese or Indo-Burmese origin, or of other races indigenous to the province.

From the preceding quotation it will appear that if it was not possible to record the existence of any considerable number of institutions specially designed for Industrial teaching, still the recognition of the value of such teaching was extending, and a good deal of unpretentious good work in the direction of Technical training was being done in the principal schools of Lower Burma. In May 1883 steps were taken by the Chief Commissioner to establish a Medical School at Rangoon; but it does not appear that the project has advanced beyond the stage of discussion.

CENTRAL PROVINCES

52. The returns from the Central Provinces show 19 Industrial schools attended by 361 students; but it is impossible to ascertain from the reports what these institutions are. An examination of the Education Report for last year conveys no satisfactory impression regarding the instruction imparted in these so-called Industrial Institutions.

The Administration of the Central Provinces relies more on the effect of scholarships and studentships tenable at such training establishments as the Poona Science or the Calcutta Engineering College than on the result of direct teaching; and it has accordingly promulgated the following rules to regulate these stipends:—

No. 458, dated 6th February 1885.—The following rules regulating Technical studentships in the Central Provinces, having been approved of by the Chief Commissioner, are published for general information:—

- (1) The Government of the Central Provinces has established thirty Technical studentships, of which twenty are for Natives who must have attended at some school in the Central Provinces for two years before election, and ten are for Europeans or Eurasians who have attended a school in the Central Provinces for at least two years previous to election, or whose near relatives are domiciled in the Central Provinces.
- (2) No boy will be elected to a Technical studentship after he has passed sixteen years of age.
- (3) No Native will be elected to a Technical studentship who has not passed the Middle School Examination.
- (4) No European or Eurasian will be elected to a Technical studentship who has not passed by the 6th standard prescribed in the Code or Regulations for European schools in the Central Provinces.
- (5) Subject to the above conditions, the studentships will be awarded to the best scholars, namely, to those Europeans and Eurasians who pass

highest in the 6th or higher standard or who have matriculated, and to those Native scholars who pass highest in the Middle School or higher examination.

- (6) The selected students will be medically examined by the Civil Surgeon of Nagpur, and, if passed by him, will be on probation for the first three months; and at the end of that time they will be accepted as apprentices if their conduct and aptitude for the work are considered satisfactory. The time spent on probation will count towards their service as apprentices.
- (7) The parent or guardian of each student accepted as an apprentice must sign an agreement in the form appended to these rules, binding the student as an apprentice to the Locomotive Superintendent of the Nagpur and Chhatisgarh State Railway or to the Assistant Manager, Wardha Coal State Railway, for 4 or 5 years, or to such other officer as the Chief Commissioner may from time to time direct.
- (8) During the first two years of the apprenticeship, each apprentice shall receive a stipend, if a Native of India of Rs. 5 per mensem, if a Eurasian of Rs. 10 per mensem, if a European of Rs. 15 per mensem, subject to such deductions for irregularity in attendance, for great carelessness or other misconduct, as the officer to whom he is bound apprentice may direct.

In case of gross misconduct or inefficiency, the stipend may be withdrawn altogether by order of the Chief Commissioner.

- (9) After 2 years the apprentice's stipend shall ordinarily cease, unless for special reason the Chief Commissioner allows it to be continued. The apprentice will then be paid by the department in which he serves according to his deserts.
- (10) Parents or guardians wishing to obtain Technical studentships for their sons or wards, who may be declared eligible under rule (5), should make applications in the form appended to these rules to the Locomotive Superintendent or Assistant Manager above-mentioned.
- (11) Each apprentice will be trained as a mechanic. Those who exhibit a talent for drawing will be trained as draftsmen, and will be eligible for appointments as Foremen. Those who show no aptitude for drawing, or for the higher branches of practical mechanics, will, after serving for a short time as firemen, be eligible for drivers.

ASSAM

53. *Assam*, like the Central Provinces and Burma, possesses no institution for instruction in the higher courses of Technical training; but it is shown as possessing 1 Industrial and 7 Survey Schools. The Industrial Institution (the Williamson Artizan School) does not

seem to be successful, nor the prospects promising. With regard to the Survey Schools, the Inspector of Schools, Assam, writes:—

These schools were all handed over to the Director of Agriculture on the 1st April 1885. Previous to that date I was able to visit three of them, and I considered the results very good as compared with anything we have ever attained to in surveying in Bengal.

HYDERABAD AND COORG

54. In the statement presented in paragraph 12 of this Note, neither Hyderabad nor Coorg are shown as possessing any schools for Industrial training. Still the following passages extracted from recent official documents indicate that something in these two Administrations in the way of Technical training is being done.

Coorg.—The Chief Commissioner, reviewing the Report on Public Instruction, writes—

In the Central School at Mercara education appears to be in a preponderating degree of a classical and mathematical character. In the year under notice, the want of a master interfered for some months with the progress of the class for Chemistry and Physics.*** In regard to Technical education generally, and specially as concerns its application to the pursuits of Medicine, Engineering, Agriculture, and artistic designs and fabrics, Mr. Girdlestone wishes to be informed whether anything more than the apparently limited course now pursued in the Central School is practicable and desirable, and whether Technical education of an elementary character could with advantage be taught in the Primary Schools.—(*Chief Commissioner's Resolution on the Coorg Public Instruction Report for 1884-85.*)

Hyderabad.—The Director of Public Instruction writes:—

In the High Schools all the classes, except the first, study the subject of drawing; and at the annual examination it appeared that five of the eight prizes were won by Amraoti and three by Akola. Three boys from the Amraoti school appeared for the 1st grade examination of the Bombay School of Art this year, and all of them passed in model drawing and practical geometry, and one in freehand drawing. The Head Master of the Akola High School says: "Somehow or other the boys do not seem to take very kindly to this art, but improvement may be perceptible by-and-by." Out of 56 pupils examined in the subject in the Training College, 33 passed the test.

The Director promised in his report to submit proposals shortly on the subject of starting a good Industrial School in Berar, as suggested by the Home Department.

PART III

55. The object of the preceding part of this note was to give a brief statement of the existing condition of Technical Education

in the various provinces of the Empire. An endeavour will now be made to set forth as concisely as the nature of the subject will

Conveyed in Home Department letter No. dated 23rd October 1884. permit the steps taken by each Government to give effect to the orders of the Government of India enforcing the necessity of improvement in the matter of Practical and Industrial training.

56. It will clear the ground if it be at once said that nowhere, except in Madras, have any practical steps been actually taken to give effect to the orders in question.

From Bombay the information received is more satisfactory for the promise of improvement which it gives than for the results already achieved. The inclination of the Bombay Government seems to be in favour of an extended system of Technical teaching as advocated by the Government of India; but no practical steps, like those to be noticed in the case of Madras, have been yet taken to give effect to this policy. In a recent letter, however, it is stated that His Excellency the Governor in Council has under consideration important measures "for the extension of higher education combined with a wider range of instruction, and for the introduction of practical subjects into the primary standards."

57. From Bengal nothing has been heard, except a general expression of concurrence in the policy laid down. But it is understood that the Lieutenant-Governor is most anxious to give effect to that policy, and that he has before him the outlines of a scheme by which effect may be given to it.

58. From the North-Western Provinces, the Punjab, Assam, and Hyderabad, we have received no notice of practical measures being in contemplation in the direction advocated by the Government of India. From Coorg also no information has come, though it may be inferred from the passage cited in page 39 [(*Sic*) See Para 54] of this note that the subject is engaging attention.

59. From the Central Provinces no active measures are, it seems, to be expected, if one may judge from the following passage (in which the Chief Commissioner concurs) from a recent Report by the Director of Public Instruction:—

I am inclined to think that the whole system as prescribed for Madras is much in advance of the state of Native society in that Presidency. But still it is as well perhaps to have a large scheme to work up to. For our-

selves, I think that for Science teaching, for Technical training, and for instruction in Art, we must depend on our colleges in affiliation with the Calcutta and Bombay Universities; on our scholarships tenable at Science colleges and at Engineering schools; on Industrial scholarships tenable at the State Railway Workshops and at the Warora Colliery Workshops; on scholarships tenable at the School of Art, Bombay; on the system of apprenticeships in the Public Works Department; and on the appointments and training offered by the Forest Department. It will be necessary. I am afraid, to increase the value of Industrial scholarships. But any proposal on this matter will form the subject of a separate communication, when we have had some experience of the working of our Industrial scholarship system. In the meantime, I can only suggest that we proceed steadily in accordance with our present system, and I may point out that whilst Madras has 1 town of more than 10,000 [O] inhabitants, 8 of more than 50,000 inhabitants, 21 of over 20,000, 44 of over 10,000 and 116 of more than 5,000 inhabitants, the Central Provinces have only 3 of more than 50,000, 3 of more than 20,000, 10 of more than 10,000, and 36 of more than 5,000 inhabitants. Technical and Industrial training would naturally be more sought after by an urban than by a rural population. Madras in the larger towns has a large class with whom mental culture is hereditary. In the Central Provinces any such class we may possess are foreigners and infinitely few.

60. From Burma the information is more satisfactory, as the following passages extracted from the Proceedings of the Burma Administration for March 1886 will show:—

Extract from a letter, dated 27th November, 1885, from Director of Public Instruction, Lower Burma.

It is impossible not to recognize in the new departure taken by the Madras Government a hopeful promise for the supply of the most crying want of the system of Indian education, as well as an example which may be followed in this province, if only at a respectful distance, with the greatest advantage to all sections of the population; and I feel sure that the cordial concurrence of the Chief Commissioner will be given to any adaptation of the scheme, or to any plan aiming at similar objects which may be found suitable to the circumstances of the province.

In this letter I can do no more than indicate in bare outline the direction which my proposals would take.

The Madras scheme is summarized by its author as a system of public examinations supplemented by liberal grants-in-aid, and the plan which I should propose would fall within the same definition.

A system of public examinations for certificates and rewards may be usefully grafted on to our existing system of provincial examinations; a system of special grants-in-aid will serve to stimulate the study of science, and of practical arts and industries in existing schools; and both together will combine to lead the youth of the province to value more highly than at present the utility of many occupations in life which are at present slighted or left out of sight rather through ignorance than from any other cause.

My scheme would at the outset involve a modification of the existing provincial standards of instruction for Primary and Secondary Schools.

Beginning with the Elementary Vernacular School, it would aim at the encouragement of object lessons and of drawing; and in Secondary Schools the prescribed curriculum would be so modified as to give pupils the option of following a literary or a practical course.

The importance of Technical Instruction being thus practically recognized, Secondary Schools throughout the province would be encouraged, by the offer of special aid in various forms, to open something akin to which is called the "modern side" of English public schools, in which a prescribed standard of instruction in general subjects having been attained, the pupil's energies would be devoted to some branch of special instruction. To each of the Government Normal Schools a special class would be attached for the training of teachers for Industrial Schools.

The Science classes of the Rangoon College might at the same time be largely developed.

Finally, for the special encouragement of Technical instruction, a series of special scholarships would be proposed tenable in any recognized Industrial School, or Industrial department of a school.

The public examinations for certificates and prizes of the students trained under this system would be open only to those who had passed a standard of general instruction equivalent to the Middle School standard.

No. 838/8586, dated the 12th February 1886.

From—A. J. WELLS, Esq., Officiating Registrar, Educational Syndicate,
British Burma.

To—The Secretary to the Chief Commissioner, British Burma.

In the view of the Syndicate one of the most pressing needs of the province, in the direction of Technical education, is the establishment of a Medical School. They think that too much must not at first be attempted. A shortened course teaching in the vernacular, instruction in the simpler operations of surgery, and in obstetrics would do much. They are aware of the difficulties which beset this project, the chief of which are the want of text-books in the vernacular and of instructors qualified to teach in Burmese. The Syndicate are willing, if desired by the Chief Commissioner, to undertake to procure professional advice in the selection of text-books, and will endeavour to arrange for their translation. It is to be hoped that amongst the students now maintained in the Calcutta Medical College by Government some suitable teachers may be hereafter found. The Syndicate are disposed to think that a commencement might now be made in the selection and translation of text-books. They hope that when the local Medical School is set on foot, the importance of the classes of Native females to partake in Medical instruction will not be overlooked.

They have reason to think that the workshops at Insein are doing excellent service in the cause of Technical education. They have the satis-

faction of observing that arrangements were made in 1884 for an increase in the number of studentships at that institution. They are inclined to think that a diploma from the Syndicate might be of service to intelligent and industrious students who have served their time in that institution; and, if the Chief Commissioner desires it, the Syndicate would undertake to conduct an annual examination in mechanical engineering.

The question is still under consideration at Rangoon.

61. It has been stated that the Government of Madras alone of Provincial Governments has already taken action, in accordance with the orders of October 1884, with a view to establish or extend a system of Technical and Industrial training. The aim and scope of the Madras scheme is to be found in the following passage in the report which Mr. Grigg, the Director of Public Instruction, submitted last year to his Government. The passage is long, but the interest attaching to it justifies its quotation:—

In England the system found to be most successful in extending and improving Technical education in Science and Art has virtually been to begin with a system of general examinations, thus creating a demand for trained teaching, and then to train teachers to meet that demand. This system leads to a continually-increasing number of new schools, and to instruction continually improved as teachers are forthcoming, abreast with the most recent progress made in Science and Arts as applied to the industries. Though in the matter of Technical education England has been generally supposed to be considerably behind its Continental neighbours, and though, to a certain extent, this is true as regards France, Germany, and Switzerland (and even Italy too, which, while ranking after the first-named countries, possesses nevertheless a well-organized system of Technical instruction), yet there is no doubt whatever that England, under the present system, is rapidly making up for lost time, and is in some respects beginning to afford a model for Continental countries. The Royal Commission (on Technical Instruction) in its last Report expressly states that "for the Technical education of workmen outside of the workshops the resources of continental countries have hitherto been and are still very much more limited than has hitherto been supposed to be the case", and that "no organization like that of the Science and Art Department or of the City and Guild of London Institute exists in any continental country, and the absence of such organization has been lamented by many competent persons with whom the Commission came in contact abroad."

The lesson to be drawn from the above would seem therefore to be that, in starting in this presidency an organization for the development of a

The italics are not in the Original. Special attention is invited to this passage, as it seems to be, as far as it goes, thoroughly sound and good advice. system of improved Technical education, it will be well, profiting by the experience of our predecessors in a similar path at home and abroad, to try the stimulating effect of a scheme of examinations, supplemented by a system of liberal grants-in-aid, making at the same time provisions for the supply, so urgently needed of well-instructed and professionally trained teachers. And, in addition to this, steps will need to be taken to develop the Scientific and Art institutions now existing of the presidency, so as to make them, not only teach all or most of the Sciences and Arts of

which need is at present felt, but also serve both for the provision of a supply of Science and Art teachers and as models for private effort.

Public Examinations.—Looking first at the effect of public examinations, it is matter of notoriety that in this country still more than at home to institute public examinations in any suitable branches of knowledge is to create a demand for instruction in them. The University examinations have called forth, in numbers far beyond all anticipation at the time they were instituted, both candidates and teachers, and the Middle School examination has been even more successful in that way.*** It must not be forgotten that the possession of certain knowledge, (provided the knowledge is sound and practical) has a direct tendency to make the possessor seek the means of applying his knowledge to the conditions in which he is placed, and thus gradually there is created a demand for specialists. And, further, the existence of readily accessible schemes of instruction in branches of knowledge mapped out in suitable syllabuses or indicated by reference to particular text-books, leads men engaged in Scientific or Industrial pursuits to seek to acquire additional knowledge in cognate subjects, and such additional knowledge the exigencies of their lives render valuable, although the men may never actually

This is quite true. appear for a test examination in it. *Thus the effects of public examinations are far more wide-reaching than the number of candidates who pass examinations would indicate.*

But, besides these general reasons, there is the more cogent and acknowledged necessity that, for students of subjects not falling within the scope of

This seems a weak point in the Madras scheme. The University should, it is submitted, be the examining body.

the University, there should be provided public examinations conducted by examiners of unquestioned special knowledge in the branches concerned, but entirely independent of the institutions presenting the candidates. Even now the Agricultural College, the School of Arts, and two or three Industrial Schools require such a scheme of examinations if they are to work with full success, and if they are to secure a full measure of public confidence, and ensure the certificates they grant being duly appreciated.

It is desirable that at first a considerable number of those who pass the examinations should find employment as teachers, and to encourage this certificate grants will be given to those who have a sufficient number of pupils *bona fide* under their instruction in special schools or classes, while result grants will be given on their pupils passing the tests fixed in this and in the Middle School Notification. And, in addition to the ordinary building and rent grants, grants will be given in aid of the building and fitting of laboratories and demonstration-workshops, and the purchase or rent of demonstration-farms. Grants will also be given in aid of museums, partly (it is proposed) in the way of building grants or rent grants, and of money grants for the purchase of models, etc.—partly in kind from the spare collections of the Madras Museum.

Science, Art, and Industrial Scholarships are also provided for, and it is hoped that by these pupils who have shown a bent for Science, Art, or Industries and a certain amount of capacity therein, but who are not able to join special institutions, may be enabled to prosecute their studies further at the Science, Art, or Industrial classes in connection with ordinary colleges. In

order to diffuse, as widely as possible, the special instruction contemplated, such classes will be permitted to be either day-classes or evening-classes, and to admit outsiders as well as the students pursuing their ordinary studies at the college to which the class is attached..... The Science, Art, and Industrial classes and schools will offer a sound Technical education to youths from Secondary Schools who are willing to enter Industrial careers, and these classes may also in time be availed of by the more intelligent artisans who have received some education at ordinary schools. Such are at present few, but their number is increasing. Industrial schools are at present few in number; but the proposed scheme will, if adopted, give a stimulus to the establishment of such, and from them a considerable number of candidates may in time be expected to come up for Industrial scholarships that will enable them to carry their Technical studies further than otherwise would be the case. Even already the publication of the last Middle School Notification has had a stimulating effect in this direction, and in a few schools, hitherto entirely of the ordinary type, the constitution of Industrial classes is contemplated, while previously-existing Industrial schools and classes are, I understand, being re-organized on a more systematic footing, so as to work on the lines laid down by Government.

Government Schools and the Training of Teachers.—To give a fair start, however, to Technical education, it is essential that Government should take the lead in such education, as was originally done in England by the establishment of the Government School of Design and the Government School of Mines, and as is at present the case in the vastly-improved institutions that have sprung from these and that now exist at South Kensington as the Departmental Normal Schools of Art and of Science respectively. Even in England, the great Technological Training College of the City and Guild of London Institute did not spring into existence till Government had set the example; and in this country, where there are no corporations with vast funds at their disposal, where private enterprise seldom leads, and where the conditions are in so many respects different, it is still more essential that Government should show the way. Just as in the matter of ordinary education, Government colleges and schools have been found necessary to create a demand for sound education, and to serve as incentives and models for the establishment of private institutions, and to create a supply of teachers, so it will have to be as regards Scientific and Technical Instruction. One institution for Science as applied to the industries connected with agriculture, another for Industrial Art, and a third for the profession of Engineering and for the allied subjects, would suffice at first as far as Madras goes, and these can be developed out of the existing institutions—the Agricultural College, the School of Arts, and the Civil Engineering College. It will be necessary to strengthen the Madras institutions which give instruction in Science, Art, or Industries, because, for some time to come, it will be principally to them that the mofussil and the outlying States will look for a supply of competent teachers. Probably, as in England, local schoolmasters who have a taste for Science or Art, especially those who have graduated in Physical or Natural Science, will, if attracted by sufficiently liberal offers, be willing to come to the capital to receive instruction and training. Others again, not schoolmasters, who have availed themselves of their advantages to qualify as teachers of Science or Art, will seek employment in that capacity, and in this way the means of instruction will in time be made available in all centres of any importance.

In all the examinations that will admit of it, there will be a practical side, and upon this feature great stress should be laid. Half the maximum marks will be assigned to this practical side, and out of that every candidate will have, in order to pass, to obtain at least one-third. This is necessary, because what it is desired to promote is, not knowledge acting on material progress merely indirectly, but knowledge which directly bears upon Industrial development. To quote from a recent speech of His Royal Highness the Prince of Wales: "Hitherto all schools have led up to the Universities, and Literary training has been encouraged to the disadvantage of Scientific instruction. Manufacturing industry has consequently not been able to attract to its pursuits its fair proportion of the best talent of the country." Not only is this still more decidedly the case in this country, but even such Science teaching as has been encouraged has been mostly theoretical, and certainly has had no direct reference to Industrial pursuits. A Science B.A. of the Madras University does not learn enough practical Science to earn his living in any Industrial pursuit in which the practical application of some branch of Science is requisite. That those competent to do good practical work will find employment there can be little doubt. Even the students of the Agricultural College and of the School of Art, in spite of the poor general attainments of the majority of them, have hitherto done so; and with an improved and more practical curriculum and a searching experimental and literary examination, they are still more likely to do so. In the syllabus of Agriculture it is provided that the full diploma shall not be granted until the student has in all (including his college course) devoted five years to his profession. Similar conditions are attached to one or two other branches. Good veterinarians will find their services in good demand, and so will good builders. Even for foresters there is a demand outside the service of this Government or of the Government of India, as Native States and large zemindars are becoming alive as to the necessity of employing them. Trained machinists have hitherto had to be brought out from England. A local supply would meet a demand slowly but surely tending to increase.

Agencies.—In each Government College, when pupils can be got in sufficient numbers to form a class, Science teachers and Drawing masters will, as soon as practicable, be appointed, and some of the existing ordinary teachers will, should the Government approve the proposal, be offered inducements to qualify in special branches, receiving grants as an addition to the salary for extra work done by them as Science or Art teachers. In most large towns there are a number of young men of some education, who will, I hope, be ready to join such special classes if the fees at first are fixed at a very low rate, and this is the very class which it is so essential to direct to Industrial occupations. It has been suggested by the Principal of the Rajahmundry Government College that a carpentry class might be worked in connection with colleges. The experiment might be tried in the Rajahmundry College if a qualified instructor can be procured. In Government Colleges the teachers of Science, Art, or Industry should be paid partly by fixed salaries (or, in the case of teachers employed in ordinary teaching also, by fixed additions to their other salary), and partly by payments on the results of the annual examinations. In Aided Colleges it is proposed that aid be given partly on the results as above, and partly by half salary grants to certificated teachers. In the beginning the certificate need not too rigidly be insisted on, provided the department deems the qualifications sufficient for the special work to be done, and the teacher agrees to study for the method

and teaching power certificate. When a museum or art collection is opened and approved of by the department, the teacher should be the curator, receiving a small extra stipend or grant, the hope of which will encourage him to push on that part of the scheme.

62. With the proposals thus made by their Director of Public Instruction, the Madras Government dealt in two ways. The Government of India had recommended a bifurcation of studies into (a) literary, (b) practical courses in High Schools. The Madras Government very wisely, it is submitted, resolved to establish the bifurcation in the Middle School, that is, a stage sooner than had been proposed by the Government of India; and it therefore took advantage of the Director's report to remodel the Middle School examination. The scheme of this examination as it now stands remodelled is reproduced on the margin *[given below]:—

*The scheme of examination shall comprise the following branches:—

A. First (or compulsory) language.	For males only	} Carpentry, joining, turning, and cabinet-making. Ironsmith's work.
B. Second (or optional) language.	N.	
C. Geography, Map-drawing, and Indian History.	O.	
D. Arithmetic.	P. (1) Jeweller's work.	
E. Mathematics.	(2) Silversmith's work.	
F. English History.	Q. Printing.	
G. Introductory Science, with one of the following:—	R. Tailoring.	
1. Physical Geography.	S. Boot and shoe-making.	
2. Geology.	For females only	
3. Astronomy.	T. Needlework; either—	
4. Animal Physiology.	(1) Industrial special branches, either—	
5. Botany.	(i) Dress-making or	
6. Agriculture.	(ii) Boot and shoe-making (in part), or	
7. Electricity and Magnetism.	(iii) Native tailoring; or	
Or one of such other branches of science as may hereafter be added to the above list.	(2) (a) Plain needle-work.	
H. Music.	(b) Fancy needle-work.	
J. (For females only) Domestic Economy.	U. Telegraphy.	
K. Drawing.	V. (1) Mercantile Arithmetic.	
L. Modelling.	(2) Advanced spelling and superior penmanship.	
M. Wood-engraving	(3) Book-keeping.	
	(4) Commercial correspondence.	

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- (5) Commercial geography.
 - (6) Short-hand writing.
 - (7) Political Economy.
 - (8) Fire, Life and Marine Insurance.
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Such other branches of knowledge as may hereafter be added to the above list.

It will be found to contain a variety of Commercial, Technical, Scientific, and Industrial subjects; and if only the teaching staff of these schools becomes in course of time adequate to the subjects to be taught, pupils desirous of qualifying for Commercial and non-literary pursuits in after-life may at this stage acquire a knowledge of the rudiments of the special branches of study or handicraft they choose to enter upon.

63. But the Madras Government was not satisfied with thus remodelling the Middle School examination with a view to making it subserve the purposes of a more practical training. It determined, in accordance with Mr. Grigg's recommendations, to go further and establish an entire system of advanced examinations in Sciences, Arts, and Industries, and, in pursuance of this object, appointed a strong Committee to consider the whole subject with reference to Mr. Grigg's report and the orders of the Government of India. The Committee had instructions to fix the details and the exact character of the syllabuses necessary to carry the policy of the Government into effect. The result was a report, following which the Government of Madras on the 22nd April last published a notification launching the new scheme of Technical and Industrial Examination in that presidency. The important portions of this Notification are here quoted:—

Higher Examination in Science, Art, and Industries.

With a view to give effect to the instructions of the Government of India, as contained in their Resolution, 10/30, of the 23rd October 1884, HIGHER EXAMINATIONS in various branches of TECHNICAL SCIENCE and ART and in INDUSTRIES will be held at such times and places as may hereafter be determined, and of which due notice will be given.

2. THE OBJECT of Government in instituting these examinations is to encourage advanced instruction in Science and Art, especially in those kinds of knowledge which bear upon the different branches of industry now existing in this Presidency or suitable for it, and to furnish a means of testing wholly, or in part, the qualifications of persons desirous of becoming:—

- I. (a) Science,
- (b) Art, or
- (c) Technical.

Teachers; or

- II. Mechanical engineers; mechanical draughtsmen; electrical engineers; telegraphists; builders; designers; engravers; decorative or art workmen in any branch of artistic industry included in this notification; or
- III. Scientific agriculturists; foresters; veterinarians; or
- IV. Managers or foremen of manufacturing, printing, and other Industrial establishments suitable for this Presidency; or
- V. Employés in posts in the Revenue, Revenue Survey, Public Works, Education, Agriculture, Forest, Sanitation, Cattle Disease, Vaccination, or other Departments which require a practical knowledge of any of the branches of Science, Art or Industry in which it is proposed to examine, and for employment in which Government may, from time to time, see fit to recognize these examinations as a test; or
- VI. Employés in similar posts under District Boards and Municipal Councils, or under private employers.

3. THE KIND OF SCIENTIFIC INSTRUCTION that it is proposed to test differs from that given in connection with the University examinations in this, that what is contemplated is not so much Abstract Science or Science studied merely for the extension of knowledge and the enlargement of the mind, but Science viewed in its application to various manufactures and industries. Similar remarks apply to the Art examinations.

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8. THOSE WHO PASS the examinations will receive SINGLE SUBJECT CERTIFICATES, GROUP CERTIFICATES, or DIPLOMAS, and to some there will, under certain conditions, be given also PRIZES and REWARDS and SCHOLARSHIPS.

THE TEACHERS of passed candidates will be eligible for GRANTS under the Grant-in-Aid Code (see Grant-in-Aid Code).

9. In connection with these examinations, SCIENCE TEACHERS, LECTURERS, AND DEMONSTRATORS will, as opportunity serves and funds allow, be provided in every Government College, which will be provided also with COLLECTIONS OF APPARATUS AND SPECIMENS and with LABORATORIES. Encouragement will be given to all recognized Colleges and High Schools to make similar provision, and to District Boards and Municipalities to establish DEMONSTRATION-WORKSHOPS AND FARMS in connection with the above teacherships and lectureships, so that theoretical instruction may be supplemented by practice.

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12. The separate SUBJECTS in which examinations will be held are, for the present, those in the following list, which, however, may be added to. Notice of any addition will be published in the *Fort St. George Gazette*:—

NOTE 1.—Till further notice, no examinations will be held in those subjects whose name in the list are enclosed in square brackets [].

NOTE 2.—Advanced examinations will for the present be held in those subjects only whose names in the list are printed in CAPITALS.

NOTE 3.—For each subject, except those whose names in the list are enclosed in square brackets, there is published a syllabus of the knowledge required for the examinations, and such syllabuses are on sale at the Madras School Book Society's Depot, Old College, Nungumbakam, Madras.

Subject:—

1. PURE MATHEMATICS.
2. PRACTICAL PLANE AND SOLID GEOMETRY.
3. Mensuration.
4. STATICS, KINETICS, HYDROSTATICS, HYDROKINETICS, AND PNEUMATICS.
5. APPLIED MECHANICS.
6. HYDRAULICS AND HYDRAULIC ENGINEERING.
7. BUILDING MATERIALS AND CONSTRUCTION.
8. Plan-Drawing from Specification and Estimate-making.
9. SURVEYING, LEVELLING, AND SETTING OUT.
10. Earth-work, Road-work, and Railway-work.
11. BRIDGE-MAKING.
12. Machine Construction.
13. Mechanical Drawing.
14. Steam and the Steam Engine.
15. Heat.
16. Light.
17. [Sound.]
18. Metallurgy.
19. ELECTRICITY AND MAGNETISM.
20. PRACTICAL TELEGRAPHY.
21. ELECTRICAL ENGINEERING and Instrument-making.
22. Electro-Metallurgy.
23. INORGANIC CHEMISTRY.
24. Organic Chemistry.
25. GEOLOGY.
26. Mineralogy.
27. Physiography.
28. [Principles of Mining.]
29. AGRICULTURE.
30. Animal Physiology.
31. General Biology.
32. VETERINARY SURGERY AND MEDICINE.

33. BOTANY.
34. FORESTRY.
35. Economic Entomolgy.
36. HYGIENE.
37. DRAWING, PAINTING AND DESIGN.
38. Modelling.
39. Wood and Copperplate Engraving and Etching.
40. Photography.
41. Printing.
42. & 43. Carpentry, Joinery, Cabinet-making, and Turning.*
44. Carriage Building.*
45. Boot and Shoe-making.
46. Tanning Leather.
47. Silversmith's Work.*
48. Jeweller's Work.
49. Watch Repairing and Clock Repairing.
50. Pattern Designing.*
51. Textile Fabrics, A.—Cotton, B.—Silk.
52. Cotton Spinning.
53. A—Bleaching, Dyeing, and Printing Cotton.
B—Silk Dyeing.*
54. Carpet Weaving.*
55. Pottery and Porcelain Manufacture.*
56. Glass-making.
57. Paper-making.
58. Philosophical Instrument-making.*
59. Tobacco Manufacture.
60. Tailoring.
61. Dress-making.
62. Lace-making.
63. Bread-making.
64. Cookery.
65. [Tuning and Repairing Musical Instruments.]
66. Music.

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18. In each subject PRIZES will be given if, in the opinion of the examiners, any candidates shall possess sufficient merit.

To the candidate who, in the Preliminary Examination, passes highest in the Presidency, and is not more than 22 years of age at the date of examination, there shall be given a medal or prize, the nature and value of which will be determined hereafter.

To the candidate who, in the Preliminary Examination, passes highest in the Advanced Examination, and is not more than 25 years of age at the date of the examination, there shall also be given a medal or prize, the nature and value of which will be determined hereafter.

[In MATHEMATICS prizes will be given only in the Advanced Higher Examination.]

19. If, in the opinion of the examiners, candidates show sufficient merit in any subject, to the first three of those candidates who stand at the head of the list of those who pass in that subject at the Preliminary Examination in any year, SCHOLARSHIPS of Rs. 12, 10, 8 respectively per mensem for the next two years will be given, provided they have passed in a subject in which there is an Advanced Examination, and continue to study it in a recognized Science, Art, or Industrial school or class. In each of the subjects in which the Preliminary Examination is divided into stages, and in each of the subjects in which there is only one examination, but that divided into stages, scholarships of half the above amounts, but tenable for one year only, may be given to the three candidates who stand at the head of the list of those who pass in the first stage: provided that in their examination they, in the opinion of the examiners, show sufficient merit, and that they continue to study the subject in a recognized Science, Art, or Industrial school or class.

No candidate shall be allowed a scholarship in Science who has not either at the Preliminary Examination itself, or at some examination accepted by the Commissioner as equivalent, passed the first stage of pure mathematics and of drawing respectively, and in one at least of the Science subjects of the Middle School Examination.

NOTE.—The object of this restriction is that the student, before commencing an advanced Science course, should have acquired such familiarity with the rudiments of mathematics and with practical draughtsmanship as shall enable him to enter with advantage on higher scientific studies.

No student shall be allowed to hold at the same time more than two scholarships. If eligible for more than two at the same time, he shall elect which two he will hold, the scholarship or scholarships rejected passing to the next in order, if, in the opinion of the examiners, he shows sufficient merit.

20. Candidates who pass first or second class in the full Preliminary Examination in more than one subject, and who, in the opinion of the examiners, show sufficient merit, shall, for each additional subject in which they pass, receive REWARDS of Rs. 12 or Rs. 6 according as they pass in the first or second class.

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64. Such then is the scheme of Technical education, which, in compliance with the wishes of the Government of India, Mr. Grant Duff has organized in his Presidency. As a whole, the scheme is a remarkable one. It gives increased prominence to the Commercial, Industrial, and Technical side of education as opposed to Literary

studies; while an excellent point is made by making the bifurcation of studies begin a grade lower down the scale of schools than the Government of India, following the Education Commission's Report, had ventured to suggest. Of course it will be necessary to establish the bifurcation in High Schools too; for High School students are not always recruited from those who have passed through a Middle School,

But if the Madras scheme has thus its recommendations, it has also its defects. It is not so much concerned with teaching as with testing the results of teaching, and it omits to suggest such a practicable modification of the existing scheme of lower general education as would include in the curriculum the studies and arts proficiency in which it proposes to test. But these defects are defects of omission; they must have been before the mind of the Madras Government, for they naturally arise from a comparison of Mr. Grigg's proposals with the published scheme; and as money and teachers become available, no doubt they will be corrected.* If, however, any scheme for the whole Empire is to be prescribed, these points must not be neglected.

PART IV

65. The preceding statement of the condition of Technical education in each province of the Empire, and the measures in progress to improve it has run on to a greater length than had been intended. It seemed, however, better to err on the side of prolixity rather than on the side of conciseness in describing the existing state of things. For it is only by a clear perception of the strong points and the weak points of the present system that we can safely introduce changes or improvements.

66. Generally, it may be said regarding our system of Technical instruction that there is much room for improvement. To begin with University education and with the Faculty of Law, it would seem that only in Bengal are the facilities for study all that can be at present desired. In both the Madras and the Bombay Presidencies sufficient facilities are not afforded for the study of the Law. In only one out of eight first grade colleges in Madras,

*Article 9 clearly foreshadows the establishment of classes in Government Colleges and High Schools when funds become available.

and in only one out of six in Bombay, have Law classes been established; while since the foundation of the Madras and Bombay Universities,* only 238 degrees in Law have been conferred by the former, and only 132 degrees by the latter. The case is far different in Bengal where Law is taught, and well taught in eight colleges, and where 1,328 degrees in Law have already been conferred by the University. Even in the North-Western Provinces, three out of the total number of five colleges have Law Schools attached.

67. There is a wide career of usefulness open all over the settled districts of India for trained lawyers. The Bench absorbs a large number, with the result that the administration of justice is greatly improved. And, besides this improvement, there is another gain in the better tone and *morale* of the native civil judiciary, consequent on the criticisms to which they are exposed at the hands of an instructed and independent Bar. It seems therefore that the establishment of Law classes in some or all of their first grade colleges is one point to which as opportunity offers the attention of the Governments of Madras and Bombay might with advantage be directed. On this head the other Presidencies or Administrations do not seem to stand at present in need of suggestions from the Government of India.

68. In regard to University education in Medicine, the organizations in the three Presidency towns seem to be all that the circumstances of the time demand. It may be admitted that *degrees* in Medicine should only be awarded when a high standard of professional education has been attained; and this seems only possible in cities where the services of an adequate teaching staff can be secured, and where the existence of large hospitals affords satisfactory opportunities for clinical and pathological instruction. The number of degrees in Medicine conferred by the Calcutta University (567) is very satisfactory; and the Bombay number (172) is encouraging. The Madras University Medical graduates are indeed few; and if we were not assured that the paucity in their numbers (which all told amount to only 45) is due to some extent to the preference of students of the Madras Medical College for British degrees, one might be disposed to suspect inefficiency in the teaching, or excessive strictness in the examination tests.

69. In the Lahore Medical College recent improvements and additions to the teaching staff have brought the Medical School

*By Acts XXVII of 1857 and XXII of 1857, respectively.

abreast of the requirements of the time and province, and no further suggestions seem to be called for here in regard to it. The Medical School at Agra, on the other hand, does not rank as a college. It is a school of third rate rank, both as regards teaching power and the character of the diplomas conferred. Having regard to the fact that Agra is the only centre of Medical education for a large and densely peopled tract of British and feudatory territory, it is worth considering whether its teaching power should not as funds admit be strengthened, and whether the school should not be raised to the same footing as the College at Lahore.

A review of medical teaching in India at the present time would be incomplete without some allusion to the great impetus which is being given to the medical training of women, by the organizations connected with Her Excellency the Countess of Dufferin's Fund. On this occasion, however, no more than a passing reference is required.

70. The facilities afforded for University training in Engineering appear, as far as mere teaching goes, to be as extensive and complete as the circumstances of the time require. The Colleges at Calcutta, Madras, Poona, and Roorkee are well-equipped, and the *theory* of Engineering is all well taught as perhaps in England. The defects seem to lie in the too theoretical nature of the teaching, in the complete isolation of these colleges, and in the want of facilities for practical instruction at Madras and Roorkee. The first mentioned defect seems almost inseparable from any system we can devise; but it can be greatly minimized. The workshops at Seebpur and Poona do much towards making the instruction in these colleges of a practical character: and it is suggested that an effort be made towards turning to similar use the important workshop belonging to the Local Government near Roorkee, and towards establishing a connexion with the Railway workshops in Madras. A year's work in these shops would form a very useful adjunct to the existing college course. The second defect is due to the entire want of Elementary and Secondary Schools of a technical character leading up to the College courses. At present the College is the alpha and omega of instruction in Engineering. This is a defect which equally exists in connexion with Schools of Art.

71. So much for the general condition of Technical training of the higher or collegiate description; we now come to Technical training in schools. First, there are the Medical Schools devised to

impart a knowledge of Medicine and Surgery calculated to place its possessors above the mere empiricism of *baidis*, *hakims*, *kobirages*, and other ignorant native practitioners. The great danger in these schools is a system of instruction too theoretical for the purpose in view. This danger was perceived some time ago in the Bengal schools, and steps taken to obviate it by simplifying the lectures and making them more tutorial, by insisting on more frequent examinations, and by more practical demonstrations. These improvements will, it is hoped, have the desired effect; but it would seem that in other provinces of the Empire as well as in Bengal the evils thus guarded against operate to a very great extent. It is desirable therefore that other Local Governments should be invited to consider the mode of instruction in these schools, with a view to rendering it more practical and intelligible to the class for whom the schools were devised. In neither Bombay nor Madras do these Medical Schools seem to be as popular as could be wished, and it would be gratifying to know that this apparent want of popularity is not due to defects of system, or to inefficient teaching. The matter is one to which the attention of these Governments might with advantage be called.

Attention has been called to the fact that the flourishing town of Rangoon is without a Medical School. So long ago as 1883 the want was felt; and in the May of that year the Chief Commissioner expressed the intention of soon supplying it. The want is still unsupplied; and the Administration of Burma may now reasonably be asked to attend to the matter.

72. As it is very desirable that medical aid for the people should be disseminated as widely as possible, attention may here be called to the fact that, while Bengal with its comparatively few large cities possesses seven Medical Schools, the North-Western Provinces and the Punjab with their many great cities are content with two schools. In the single city of Dacca in Bengal there is one Alopathic and two Homoeopathic Schools, and the competition is only productive of good. The Medical profession even in its lower grades affords to fairly educated men an excellent opening and an independent career.

73. The success which has attended Survey Schools, wherever they have been established, is an encouragement to extend the system. There is in every district in India ample employment for competent surveyors, for the qualifications of the ordinary *amin* leave much to be desired. If, after suitable survey schools had

been provided, our Civil Courts employed, by preference, surveyors or valuers who had certificates from such Schools, not only would an impetus be given to this description of Technical education, but a great boon would be in course of time conferred on the people in the provision of a more respectable class of professional surveyors and valuers. Local Governments and Administrations might, therefore, be asked to take into their consideration this question of Survey Schools. An educational qualification should be insisted upon before a student is admitted to such a school. The character of the students and the reputation of the profession would thus alike be raised in the public esteem. Local Governments might also be asked to consider whether by degrees the surveyorships and valuatorships to Civil and Revenue Courts and authorities should be restricted to passed students of these Survey Schools.

74. On the question of Agricultural Schools and Colleges some opinion has been already expressed. Here all that need be added is that if such schools and colleges cannot now be provided, we should at all events do what can be done by an extension as far as funds allow of that system of Agricultural classes in Middle and High Schools which is found to answer in Bombay. There is room for hope that conjoined with a system of public examinations, this plan will in time supply a demand for higher and more systematic instruction in Agriculture.

75. We now come to Art Colleges and Industrial Schools. The previous remarks made on this subject will have suggested that if these Art Schools in the Presidency towns and at Lahore have not as yet made much impression on the Industrial life of the country, it is not so much because their aims are untrue, as because they keep no touch with the Industrial system they are devised to assist and improve. On the other hand, the so-called Industrial Schools, modelled upon no considered plan, and cut off from communications with the Schools of Art which should be to them sources of inspiration and guidance, never rise above mere workshops for the production of inferior articles at extravagant cost. For all purposes of practical training they are useless; and it is no exaggeration to say that of the 45 Industrial Schools which now exist in India, hardly one serves any true educational purpose. If, therefore, anything effective is to be done in the way of Industrial training in Indian schools, we must begin anew and construct a system of Industrial education. The question for decision is then, upon what principle and by what adaptation of means to ends can such a system be constructed?

76. Authorities* agree in thinking that the true principle from which to start is that Technical instruction must not be considered as something separate and apart from ordinary general education. On the contrary, it should be regarded as a development of such education. The scheme of general education should therefore be so arranged as without any break of continuity to lead up to the instruction which we call Technical. If this be the true principle on which to proceed, it is manifest that nowhere in India has our educational system given to that principle the prominence which it deserves. Leading, as it does, to University examinations and University degrees alone, our educational system has always concentrated attention on literary subjects and literary training. But as Technology is the study of the practical application of Science, a system of education which has for its aim the acquisition of literary knowledge only can never be a satisfactory introduction to Technical instruction. As Science is the foundation of every branch of Technical instruction, the principles of Science ought to underlie the education of those whose aim in life is the practice of the Industrial Arts.

77. Education will usually begin with "the three R's"; and it is, of course, necessary that some advance should have been made with the elements of language and mathematics before progress can be made with even rudimentary Science. But all authorities agree that the study of drawing should be introduced at the earliest possible age; that it should be placed on the same footing as writing; and that it should be continued throughout all subsequent stages of the student's educational career. The Royal Commissioners on Technical Education are at great pains to enforce this principle:—

"Your Commissioners," they say, "are of opinion that sound instruction in the rudiments of drawing should be incorporated with writing in all primary schools, both for girls and boys, by which also, according to the experience of competent authorities, the writing would be much improved. Something in this direction has already been done in many good infant schools, where children of the age of six draw triangles, squares, oblongs, etc., on their slates."

*Report of the Royal Commission on Technical Education.

Papers by Professor Pedler of the Calcutta Presidency College and Professor Monnay of the Sibpur Engineering College.

Reports of Mr. Grigg, Director of the Public Instruction, Madras, of Mr. Tawancy, Officiating Director of Public Instruction, Bengal, and of Mr. Lee-Warner, Officiating Director, Bombay.

A pamphlet entitled "How to introduce National Technical Education into India" by Mr. Dinshaw Ardisir Taleyakkan (Baroda, 1884), contains some sensible suggestions.

78. When some progress has been made in "the three R's," attention should be directed to Elementary Science:

"For the great mass of our working population," write the Royal Commissioners, "who must necessarily begin to earn their livelihood at an early age, it is essential that instruction in the rudiments of the sciences bearing upon Industry should form a part of the curriculum of the Elementary Schools, and that instruction in drawing, and more especially in drawing by rule and compass, of a character likely to be useful to them in their future occupations as workmen and artisans, should receive far greater attention than it does at present. The importance of the first of these subjects has been so far acknowledged by the Education Department, that in all Infant Schools simple lessons on objects and the more commonly occurring phenomena of nature have been made obligatory. This system of instruction, if properly illustrated by the object itself or of diagrams or models of the same or by the simplest kinds of experiments, is an excellent foundation for the subsequent teaching of Elementary Science."

And again:

Geography, if properly taught, is a branch of Elementary Science which need not be separated from Science generally, and can well be taught along with the other branches of Science by means of object lessons. In this way the connecting link between Science as taught in the Infant School and in the higher division of the Elementary School will be supplied.

A preliminary education founded on the preceding principles would form the most appropriate introduction for all forms of Technical instruction that could be devised, while it would help to give to the education of those not intended for Industrial pursuits that practical character which is now so wanting. Children under such a system would have their faculties of thought and observation trained, while now the only faculty that is trained is the memory.

79. Following on such a Preliminary education, of which Reading, Arithmetic, Writing, Drawing, and Elementary Science would form the prominent features, would come that separation of studies which the student's proposed career in life would necessitate. Those who were intended for the learned professions, the Bar or Medicine would follow the literary courses which lead to the existing Entrance Examination of the University. Those who looked to Art or Engineering or Commerce or Agriculture would pursue the "modern" curriculum advocated by the Education Commission, and leading to an alternative Entrance Examination which the Universities should without unnecessary loss of time be invited to establish. Those who looked to Industrial pursuits would enter the Schools of Technical training, if indeed they did not select to push their preliminary education still further by going

through the "modern" curriculum. These three divergent courses should take off from the common stem at the end of the Middle School course, as recommended by the Madras Government. The High or Zillah Schools would thus in all cases consist of a "literary" and a "modern" side, which is in full accord with the recommendations of the Education Commission and with the declared policy of the Government of India.

80. It will be observed that the Royal Commissioners recommend the introduction of Drawing and Rudimentary Science into the curriculum of Primary Schools. We must not, however, be misled by identity in nomenclature into thinking the enforcement of such a recommendation possible in all Indian Primary Schools. The Indian Primary School is a very multiform entity indeed. In Bengal, where primary education proceeds on the basis of controlling and by degrees improving Indigenoûs Schools, teaching in the old native plan, the introduction of Drawing or Science lessons into the Village School or *patshala* would be at the present moment wholly premature and impossible. The schoolmasters are unfit to teach such subjects. In Bombay, on the other hand, where very many of the Primary School teachers have passed through training institutions, and teach on approved methods, the introduction of Drawing, etc., into the school curriculum might possibly be enforced. What is suitable for one part of India may be unsuitable for another part; and we shall miss our end if we strive after uniformity which is not attainable. While making due allowance for such local peculiarities as those referred to, and while permitting the utmost freedom to provincial and local endeavours, it seems that for the present we should leave the Indian Primary School out of our consideration; and that in any change of system or addition to the curriculum that may be determined upon the Government of India should not aim at going lower down in the scale than the Middle School. But in every province we should operate through the Middle School (and *à fortiori* through the High School) whether it be founded on an English or on a Vernacular basis. We shall thus circumscribe our efforts, which in a novel undertaking is always desirable; and we shall appeal to a higher degree of intelligence in our students while counting on a more instructed class of teachers.

81. The Middle or High School student, who is able to read, write, and cast up accounts, and has been grounded in the rudiments of Science in addition to knowing something of Drawing, now looks about for a school in which to prosecute his Technical

education. It will simplify the difficulty of providing such a school if we first consider what should be taught our student in the school he is looking for.

82. The various industries or professions which may be made the subject of Technical education are classified by Professor Pedler, of the Calcutta Presidency College, under four divisions:—

- A. Applications of Science.
- B. Applications of Art.
- C. Agriculture.
- D. Commerce.

With Agriculture and Commerce it is not now proposed to deal.

The industries classed as “Applications of Science” admit of a further division into five heads:—

- (a) Industries dependent on the application of chemistry, such as dyeing, printing, textile fabrics, paper-making, sugar-refining, glass manufactures.
- (b) Industries dependent on the application of Physical Science, such as electro-engineering, electro-metallurgy, etc.
- (c) Industries dependent on the Sciences—geology, metallurgy, mining.
- (d) The textile industries which depend partly on Physical, partly on Mechanical, Science.
- (e) Mechanical industries, such as manufacture of cutlery, locks, screws, electro-plating, etc.

The training necessary for those who intend to follow the industries coming under the designation of Applications of Art may be sub-divided into—

- (a) training for architects, artists, draughtsmen, designers;
- (b) training for engravers, wood-engravers;
- (c) training for modellers and manufacturers of pottery;
- (d) training for furniture and wood-work manufactures.

83. The preceding classification may be considered for present purposes to exhaust the subjects on which Technical training will be in request for many years to come in India. Indeed, it is

obvious that many of the industries are still questions of the future. Some of them, however, are matters of present interest; others of them, though of prospective importance, have now to be provided for; and the question is, how are we to establish the schools in which the necessary instruction can be imparted to students desirous of making a livelihood by the practice of such industries?

Putting out of consideration for the moment the important question of finance, two difficulties here present themselves—the difficulty of obtaining competent teachers, and the difficulty of incorporating the school when we have found our teachers with the educational system of the province. The Government of Madras hope to overcome the first difficulty by the operations of private enterprise. They expect, by the establishment of a system of public examinations, to create a demand for trained teachers, and by the effect of this demand to produce the necessary supply. It is probable that the expectations of the Madras Government will be largely fulfilled. This means of stimulating education should therefore not be neglected in provinces outside Madras; but other Local Governments should also be invited to supplement arrangements for training teachers by a system of examinations calculated to stimulate a demand for them. And in this connexion the question arises, whether efforts should not be made to induce the various Universities to undertake the examinations, and thus afford a further evidence that Technical instruction has been made an integral part of the education of the country. This is a point to be referred to at greater length later on. Here it may be said that there is unquestionably great force in the view that examinations should be conducted by the Universities, and not by the Government through Boards constituted for the purpose. The Universities have become a power in the land. They are looked up to and revered by the educated classes. If they can be moved to identify themselves with this movement in favour of Technical education, their countenance will more than any other influence tend to counteract and abate those feelings whose nature and force Mr. Kipling (a competent authority) thus describes:—

The prejudice against manual labour which exists among the upper classes is still stronger than many of us are apt to think; and when we speak of Art, its beauties, refining influences, etc., we do not reflect that for centuries the most important subjects that our school teachers have been set down in the Kama Shashtra among the 64 accomplishments—mostly trivial—in which the public women, or Hetairae of the country, are supposed to be proficient, while philosophy, religion, poetry, *belles-letters*, administration, etc., were considered the only pursuits to which a man of position should seriously apply himself.—(*Report on Mayo School of Art for 1884-85*).

84. But, though we may agree to invoke the aid of examinations in the general direction indicated by the Madras Government, we should not trust to that plan alone. It is therefore most desirable to make all the use we can of existing Training Institutions, with a view to turning out competent masters, and to spare no reasonable expense in the way of stipends while the teachers are at the Training Schools, and of good pay afterwards to attach them to our service. It is to the employment as teachers of persons, themselves untrained, to train others that much of the discredit has arisen that now attaches to Technical Schools.

85. Having procured our teachers in one or other of the ways indicated in the preceding paragraph, we have now to see how our schools are to be established. For the establishment of schools the Madras scheme trusts much to private enterprise. The ultimate effect of private enterprise in creating such schools as we want may be considerable, but it is clear that the operation of that agency will be slow. In this matter of Technical Instruction the Government must pioneer the way, as it has pioneered the way in almost every enterprise which has changed the aspect of Indian life. If progress is to be made at once, the Government must, on fit opportunity and with due regard to local circumstances, establish in every division or district a Technical School or a Technical Department of a school to which the instruction imparted in the "modern" side of the Middle or High School will furnish a fitting introduction.

86. The school so established must be an integral part of the educational system of the province. If past experience proves anything, it seems very clearly to prove the utter hopelessness of expecting that from isolated Industrial Schools any general good can come. On this point special attention is invited to the opinion of Mr. Tawney, Officiating Director of Public Instruction in Bengal. What Mr. Tawney says of Bengal is equally true of every other province of the Empire.

The institutions were isolated and out of connexion with the general system of education in Bengal. They had no prestige of any kind attaching to them, and were therefore unable to make way against the general current of native prejudice. They were insufficiently supplied with funds, and no bright prospects were opened, even to the most successful of their pupils, resembling those lying before the more distinguished pupils of the School of Naval Architecture and the Economic School of Mines. *If they had been furnished with schools leading up to them, in which the head and eye were trained to do their work efficiently, and if they had been in any way connected with the*

system of education centralised in Calcutta, their fortunes might have been different. As it is, I cannot believe that these efforts have been completely thrown away. There can be no doubt that the horizon of young India is widening that a great many of the more energetic of our native youths are beginning to be dissatisfied with a purely literary education and an official career under Government, and are eager to take part in undertakings which shall advance the economic welfare of their native land. They naturally look to the Government to give a definite aim to their aspirations, and to furnish the machinery necessary for their realization.

87. If, therefore, our Industrial Schools are to lead to any practical good, they must be an integral part of the Provincial educational system. The District Industrial School must be a department of the District High School; all the prestige which attaches to the High School must attach to it, and so on with all other Industrial Schools in their various degrees. Furthermore, these Industrial Schools must be linked to a Central Institution, which should be the highest embodiment of Instruction in the particular art or industry with which the school is concerned. This Central Institution, be it the Presidency School of Art or the Engineering College, must not only direct and control the teachings of the schools scattered throughout the province, but inspire them with new ideas and furnish them with good designs. For the schools which come under Division B on page 62 above [(*Sic*) See Para 82], the various Schools of Art at the Presidency towns and at Lahore at once furnish the Central Institution which is required. For the schools which should fall under Division A, no Central Institution at present in existence may serve all purposes of control and direction; but the Engineering Colleges will, at all events, serve the purpose to some extent.

88. Even at the risk of repetition and prolixity, the present writer would most strongly urge the view which is, indeed, confirmed by the experience we have had upon this question, that no system of Industrial Schools can possibly work in India which does not proceed upon the principle that all Technical Schools of a particular class shall depend on, and be subordinate to, a Central Institution. No Industrial School should be established except with the concurrence of the Director of Public Instruction and of the Principal of the Central Institution. These officers should decide whether in a particular locality an Industrial School is wanted, and they should prescribe its curriculum when the school is established. The Central Institution, whether we call it a School of Art or a Science and Art Department, should gather up in itself all that is best in the Art and Industrial traditions and workmanship of the province, and it should be enabled to attach to itself by stipends and scholar-

ships all promising pupils, some of whom would doubtless adopt the profession of a teacher. The Central Institution should decide, in communication with Local Boards, District Officers, and Directors of Agriculture and Commerce, when a particular industry in a particular place needed encouragement and training; and the expense of the school then established might reasonably be in whole or part a charge on local funds. This scheme will, if approved, work in with the system of Economic and Industrial Museums, which has recently been engaging the attentions of the Government of India, and, among Local Governments, more especially of the Government of Bengal.

89. It has been said that the difficulty regarding teachers is one which cannot be overcome immediately. It is fortunate, however, that it does not arise so much in connexion with the training in the Central Institutions, and therefore the concession of liberal support to the Central Institutions is of prime importance at the present moment. Hitherto our Schools of Art and, it may be added, of Engineering have not been richly endowed; now they should be freely supported. No doubt public liberality and beneficence will, if appealed to, also largely help in this good work, as it has largely helped in the cause of Literary education. The advantages of Literary education are perceived by all, and not only has the Indian public come forward most generously to endow Literary Colleges and Schools, but private enterprise has seen in the establishment of such educational institutions the means of competent livelihood, and of an honourable and useful career in life. Indeed, it has thus come to pass that private enterprise in such educational undertakings is so well to the front, that there are not wanting indications that Government is occupying a field which, if abandoned, would be taken possession of by independent agencies. The Education Commission has advocated the gradual abstention of the Government from the work of higher education in India; and though this abstention must not be practised except where the interests of higher education can be safely entrusted to other hands, the accepted policy on the point must not be forgotten. It will be possible on suitable opportunities, in pursuance of this policy, to hand over some schools and colleges to private enterprise. Large funds may not be at first set free, for local bodies must be treated liberally in undertaking fresh responsibilities; but ultimately the entire cost of the schools and colleges transferred will be available for the promotion of Technical education.

90. It has been stated above that the public examinations in Technical and Practical subjects which it is proposed to inaugu-

rate should be conducted not by Government, but by the University in each Province. This is also the opinion of Mr. Tawney, the Officiating Director of Public Instruction in Bengal, who in this matter is justly entitled to a respectful hearing. In a recent report which supports most of the positions contended for in the preceding remarks, Mr. Tawney observes as follows:—

I have always thought that the only way to make Technical education really popular is to induce the Calcutta University to take it up. No subject that is not recognized by this body can in the long run hold its place in schools. It is idle to imagine that, when schools are made over to District Boards, these bodies will keep up teachers of subjects that the boys do not wish to study and their parents do not wish them to study. But the University can always create a demand for the teaching of any subject by simply introducing it into its examinations. Now there is one subject which all authorities on Technical education consider indispensable, namely, Drawing. Messrs. Pedler, Schaumburg, and Monday would have it introduced into all schools. They are agreed that the training which this subject gives to the hand and eye constitutes the most useful preparation for Technical instruction. Mr. Pedler would have it taught (as is, I believe, done in Germany) along with writing. On this point the late Mr. Locke wrote (report for 1878-79): "We have to begin—absolutely at the beginning—blackboard work with our new students, which is as though at the Presidency or Medical College the students had to begin their course by learning to read and write. This state of things will doubtless continue as long as simple outline drawing (of the most elementary kind) is not placed beside reading and writing as part of the instruction in every school, even the humblest, receiving Government aid. It has been so in England for the last twenty-five years. No parochial schoolmaster can get a certificate unless he can teach the drawing of simple figures on the blackboard." I may mention that all the works on Technical education in Europe that I have been able to consult hold similar language with regard to the importance of Drawing.

Now Government might perhaps induce managers of schools to appoint teachers of this subject by offering to pay their salaries and giving prizes and scholarships for proficiency in it. But the University can bring about the same result by simply paying a gentleman to examine in it. Examination is the central idea of Mr. Grigg's system, and I am only imitating his example in insisting upon the great power of this agency in India. But I think it particularly important that the examination which I would introduce should be conducted by the University. I therefore recommend that the University of Calcutta be asked to institute an alternative Entrance Examination of a practical character, somewhat resembling the final examination in Schedule I of the Code for European and Eurasian Schools. I would propose the following subjects for this examination:—

1. Mathematics as at present (including, be it observed, Mensuration).
2. History and Geography as at present.
3. Elementary Physics.
4. Elementary Chemistry.
5. Mechanical Drawing.

I would compel all students, who propose to take up Engineering, to pass this examination, but no others. Many would take it up to escape the technicalities of English grammar, and the much dreaded second language. It might be asked why I exclude English. I answer that I would have all the papers answered in English, but my experience teaches me that the study of a literary masterpiece does not always give a command of ordinary every-day English, and that it is a great strain upon the students. I regard the play of Shakespeare in the final standard of Schedule I as rather unnecessary. But it is of course easier, or ought to be, for a European to get up Shakespeare than for a native of this country. The subjects I have introduced need, I believe, no apology. I would not prevent any one who passed this examination from going on to the ordinary First Arts Examination, if the University did not wish to provide an alternative course in this also. I believe that this proposal would meet with a ready acceptance in the Senate. It is possible that the Faculty of Medicine would prefer this entrance course to that now required as an introduction to the study of that Science. I may remark that at present every student must acquire a good knowledge of Physics in order to pass the First Arts Examination, and that the B course of the B.A. Examination is mainly scientific, though the subject of English literature is unfortunately still retained in it.

Should the above proposal be accepted, it will perhaps be necessary to introduce some teachers of drawing into those Government Schools* that are not immediately made over to District Boards. But it is clear that we shall never obtain a really high class of Technical instructors until the Central College recommended by Mr. Pedler is established.

91. Mr. Tawney's remarks suggest that the proposals which he advocates for the promotion of Technical Instruction can be carried into effect without difficulty or material change in the existing system. In confirmation of this view, the following passage is quoted from the Minute by Professor Pedler, to which reference has already been made. It expresses the view that His Excellency's intentions in this matter can be carried into effect, at all events in Bengal, without any dislocation of the existing educational arrangements. To give full effect to the new plan, additional training facilities will no doubt be needed: but if this be not considered a question of the immediate present, it may well be entrusted to the care of those who will succeed His Excellency in the government of the Empire:—

If then the greater part of Technical education is or should be merely an extension of ordinary education in particular directions, the question naturally first arises whether Technical instruction should necessarily be given in separate or special schools, or whether the institutions devoted to the general purposes of education could not be utilized to a large extent for imparting the earlier portions of Technical training. There would certainly seem to be no reason why the institutions which are already giving education in

*Also in District Board Schools. This is essential, as Aided and Middle Schools are made over to District Boards, by the Bengal Self-Government scheme.

India with a view to entering into a college, or with the final aim of the student attaining a University degree should not by a very slight modification of their system of teaching be made to embrace the required teaching of Elementary Science, of Drawing, Design, etc., which are the elements on which all Technical instruction is based; and further, there would appear to be no reason why the further study of pure Science, both practically and theoretically, which is the first step to the higher Technical instruction, should not be carried on in such existing institutions as the Government Colleges, etc., by perhaps a slight enlarging of the sphere of work and a slight strengthening of the staff. Up then to the final stage where the Technical student requires to be taught the practical application of Science, or of general principles to the actual work or industry which he will afterwards have to practise, there is no reason at all why the present educational institutions, slightly modified and extended, should not carry on the work required. But in order to carry out the final part of the training, no facilities to any extent at present exist in India; and thus the final and most important part of the training will have, if the work is to be thoroughly well done, to be separately provided for by the creation of new institutions. It is true that this part of the training could also be given by a very considerable expansion of educational institutions at present existing, and this would probably be the most effective way of proceeding and of utilizing the existing organization for education; and, if such a simile can be used, the manner of expansion will be similar to that which took place in education in Bengal, as regulated by the University examination, some fifteen years ago, when to the purely Literary education which had previously obtained the study of Science was affiliated, though in a theoretical and unsatisfactory manner; and now what is required is to give greater facilities and opportunities for the practical study of Science, and to affiliate on to it the study of the practical application of Science or of general principles, and thus to provide instruction in Technology.

92. It may be convenient to summarize here the chief recommendations which seem to emerge from the preceding remarks. These are:—

- (1) that enquiries be made whether it is not desirable that greater facilities for the study of Law and Medicine be provided in mofussil Colleges in Madras and Bombay;
- (2) that the teaching staff of the Agra Medical School be strengthened and the status of the school raised to an equality with that of Lahore;
- (3) that a Medical School be established at Rangoon;
- (4) that the instruction in all Medical Schools be made more practical than at present;
- (5) that facilities for practical training be provided at the Roorkee and Madras Civil Engineering Colleges;
- (6) that an Art School on the Lahore plan be established at Agra;

- (7) that opportunity be taken where possible to establish Agricultural and Veterinary Schools or classes in High Schools;
- (8) that more attention be paid to the teaching of land surveying; and that Civil Courts and other official bodies be required to employ certificated students of such schools in preference to non-certificated surveyors;
- (9) that instruction in drawing be made compulsory in all schools the teachers of which are competent to instruct in drawing;
- (10) that competency to teach drawing be made as soon as possible an essential qualification in all teachers in Middle and High Schools;
- (11) that instruction in introductory science (the particular subjects or branches to be prescribed by the Education Department) be made compulsory in Middle and High Schools, similar provision being made as in the preceding head regarding teachers;
- (12) that examinations in Middle Schools include drawing and elementary science as compulsory subjects; and that a considerable latitude as to optional subjects of a practical character be allowed as in the Madras syllabus (paragraph 62 of this note);
- (13) that the High School course be of two kinds—(a) literary, (b) practical or “modern”, as recommended by the Education Commission;
- (14) that to Middle or High Schools there be attached a Technical Branch whenever enquiry brings to light the demand for Technical training in any industry in the locality;
- (15) that such Technical Branch be an integral part of the Provincial educational system, subject to the control of the Education Department, and leading up to an examination to be instituted by the University;
- (16) that, subject to the general supervision and control of the Department of Education, such Technical Schools be under the direction as to curriculum, etc., of the Central Art College (which should be affiliated to the University) or Engineering College* of the Province, as the case may be;

*Already affiliated in all Provinces.

- (17) that the University establish two Entrance examinations—one literary, as at present; one “modern”, as recommended by the Education Commission. The “modern” examination to include optional subjects to meet the requirements of Division A and Division B of paragraph 82 of this note;
- (18) that funds be provided for the promotion of the foregoing scheme by State grants when possible; and by appropriating some of the allotments now made to the support of higher English education, wherever this can be done without detriment to the interests of that education. That Municipalities and Local Boards who are chargeable with the support of education be also required to allot funds for Technical Schools, where the establishment of such be considered desirable.

93. All has now been said which occurs to the writer to say in fulfilment of the Viceroy's commands. In conclusion, it may be observed that, although among the higher caste natives of India the obligations of caste still give a *quasi*-religious sanction to the distinction between the employments deemed menial and those deemed honourable, there are, nevertheless, indications that this sanction is losing something of its force, and that natives of all castes are in increasing numbers looking to Technical education as affording an honourable livelihood and career in life. It is submitted that it is desirable to assist and encourage this popular feeling; that room exists for improvement in almost every department of Technical Instruction in India; and that the time is ripe not only for calling on Local Governments to take the matter up in earnest, but for indicating to them some of the directions in which improvement seems possible, and from which funds can be obtained for effecting it.

[*Home Education A Proceedings, July, 1886, No. 27.*]

2

RESOLUTION ON INDUSTRIAL EDUCATION AND INDUSTRIAL SURVEY OF INDIA

Recommendation of Education Commission to introduce secondary school courses preparing boys for industrial or commercial careers—Government of India's proposal to promote such type of technical education as deemed serviceable to existing industries and leading people to make better knowledge of agricultural science.

* * * *

IN paragraph 12 above reference was made to industrial schools. Upon this subject the Government of India in 1886 circulated a memorandum to all Local Governments and Administrations, in which the position of industrial schools was set forth, and it was shown that hitherto little progress of a substantial character had been made in promoting technical education. Since then the subject has received much attention both from the public and the various Local Governments. Technical education has been brought into prominence by the pressure of two sets of considerations, which, though cognate, are not identical. In the first place, it had been observed that the object of the Education Despatch of 1854, that "useful and practical knowledge suited to every station in life" should be "conveyed to the great mass of the people" of India, was not being attained by a State education too purely literary, and leading too exclusively to literary culture. It was accordingly recommended by the Education Commission, and accepted by the Government of India as a reform to be desired, that a secondary school course should be introduced, which should fit boys for industrial or commercial careers. This recommendation however, though in the right direction, was wanting in the precision necessary in a working rule, and to give it requisite definiteness, it was suggested in the memorandum of the Home Department, referred to above, that drawing and the rudiments of the sciences should be taught in all but the most elementary schools; and that generally throughout the educational system the study of natural science and the cultivation of the faculty of observing and reasoning from observation and experiment should be encouraged. In other words, it was suggested that studies which may incline to the application of natural science and to scientific research should not be neglected in favour of literature.

23. The second class of considerations which have forced this question into prominence is concerned with the need of industrial occupation for a population rapidly outgrowing the means of support supplied by a too conservative system of agriculture. It is also concerned with the need for scientific methods to develop the material resources of India and to improve its agriculture, its products and manufactures, so that they may better hold their place in the markets of the world, where competition is carried on with an intensity of purpose, which has been compared to the conditions of warfare. But technical education in this latter sense—that is, in the sense of industrial education—is a matter not so easily dealt with as the technical education of the general preliminary character referred to in the preceding paragraph; and it therefore seems desirable that if the present impulse in its favour is to be successfully directed, the conditions of the question should be clearly understood.

24. Technical education proper is the preparation of a man to take part in producing efficiently some special article of commercial demand. It is the cultivation of the intelligence, ingenuity, taste, observation, and manipulative skill of those employed in industrial production, so that they may produce more efficiently. And thus technical education of the special, as contra-distinguished from the preparatory, kind is an auxiliary of manufacture and industrial capital. In India at the present time the application of capital to industry has not been developed to the extent which in European countries has rendered the establishment of technical schools on a large scale an essential requisite of success. But the extension of railways, the introduction of mills and factories, the exploration of mineral and other products, the expansion of external trade, and the enlarged intercourse with foreign markets, ought in time to lead to the same results in India as in other countries, and create a demand for skilled labour and for educated foremen, supervisors, and managers. It may be conceded that the effect of these various influences on an Asiatic people is very gradual, and that it would be premature to establish technical schools on such a scale as in European countries, and thereby aggravate the present difficulties, by adding to the educated unemployed a new class of professional men for whom there is no commercial demand. Still a large field is open for the action of Government and public liberality in the direction of promoting special technical education suitable to the immediate requirements of the country and capable of expansion with its growing necessities.

25. The practical conclusion, then, which the Government of India draws from the foregoing premises is, that it should support technical education as an extension of general education in the sense

indicated above; and, furthermore, that it should promote and countenance such technical education of a special character as may be applied to the service of existing industries, which will profit by the aid of scientific research, scientific method, and higher manipulative skill.

The field of operation being thus defined, it would seem necessary to begin with industries which are in some degree centralized, which are growing into importance with the new growth of trade and manufactures, and which are capable of improvement by the application of scientific principles to materials and processes. At the centre of such industries a technical school will be useful. To the great railway workshops and factories may with undoubtedly great advantage be attached schools of drawing and design, and of practical instruction in the scientific principles of the handicrafts there carried on. And probably in large stations and municipal towns there will be a demand which will repay those who acquire in local industrial schools superior skill. If caution at the beginning secures success; if capital is tempted by degrees to launch itself in commercial enterprises and the development of the material resources of the country; if a larger demand for the products of skilled labour springs up—then larger developments of special technical education may be fostered in complete harmony with the sound principle that supply should follow demand.

The subject is of such extreme importance, and the insignificance of what has been attempted in India is so conspicuous, that the Governor-General in Council is deeply impressed with the necessity for action in whatever way may be practicable and sound. Some Local Governments have indeed recently taken practical measures to promote technical education, and these measures have been viewed with much satisfaction by the Government of India. But as it is desirable that the step best calculated to promote technical education should form the subject of continuous enquiry and discussion, the Governor-General in Council suggests that Local Governments and administrations should on a convenient but early opportunity take action in two ways. Impressed with the existing want of information at hand as to the extent, character, and circumstances of important local industries in every province of India, His Excellency in Council would, in the first place, suggest that in each province an industrial survey should be completed. In the second place, he would recommend that, with a view to turning the knowledge acquired by such a survey to the best account in the light of the abundant information contained in the Report of the Royal

Commission on Technical Education, each Government and Administration should form a committee of educational experts and professional men, who should make suggestions from time to time for the auxiliary supply of appropriate means of technical education; for such modifications of the State system of public instruction as may aid and encourage industries and industrial employment up to the full measure of such requirement at each provincial centre as may be found to exist; and, when the circumstances are opportune, for the establishment of a Technological Institute, for the enlargement of the provincial Schools of Art and Design, and for the larger co-operation of the University in the promotion of the object in view.

In furtherance of these suggestions, much valuable aid can be rendered by the various Provincial Departments of Land Records and Agriculture upon which the Resolution 6/340-50 of 8th December 1881 laid the duty of promoting new industries, and of leading the people to a fuller knowledge of agricultural science.

[*Home Education B Proceedings, January 1891, Nos. 14-15**; *Papers relating to Technical Education in India (1886—1904) pp. 36-37 (Calcutta 1906).*]

*The document has been destroyed and is not available at N.A.I.

SIR A. COLVIN'S MINUTE ON TECHNICAL EDUCATION

State of technical education in N.W.P. & Oudh and measures taken in the direction in other provinces—proposal for establishment of Faculty of Engineering or institution of special examination of commercial and practical character at Allahabad University—Government of India's proposal for institution of alternative examinations in upper classes of High Schools—proposed technical school at Lucknow—proposed measures for development of technical education in N.W.P. & Oudh.

THE question of Technical Education has been lying by for consideration since I took charge of this office. I have abstained from dealing with it hitherto, partly because more pressing affairs engaged my attention, and partly because the question has been meanwhile under discussion in other Provinces where there were in some respects greater facilities existing for its solution; and I judged it expedient to wait and see what form the decision took elsewhere, before deciding what should be done here. A considerable amount of material has thus been collected. We have before us the experience of Madras, Bombay, and of Bengal. We have also papers on cognate subjects, such as the establishment of a practical alternative Entrance Examination by the Allahabad University; the proposals for the establishment of a Faculty of Engineering in the Allahabad University; the establishment of a Jubilee School of Arts and Industry at Lucknow; and the question of an Industrial Survey. This latter question I have discussed separately with Mr. Holderness, and it need not at present be taken into consideration further. The decision I have arrived at is that in this direction no further information is required than has been collected up to the present time in these Provinces. The matter has for some time past occupied the attention of this Government, which has before it full accounts of all the industries practised within its limits. The steps taken in pursuance of the Resolution of the Government of India, No. 239, dated 14th March 1883, will be found in the Revenue Proceedings of the North-Western Provinces and Oudh Government for February 1884, and in subsequent papers. The conclusions embodied in this Minute will show that there seems to me no primary connection between further action in connection with an Industrial Survey and the present development of such technical training as in these

Provinces will prove most immediately useful. It may be, however, possible to establish at Lucknow, in connection, perhaps, with the Arts Museum at that place, and with the aid of funds which have been voted by the Talukdars, a technical school having for its object the improvement of the *technique* of one or more of the handicrafts practised in these Provinces; but I think it is desirable to treat that part of the question as subsidiary to inquiry and the formation of a final opinion on the particular branch of the subject dealt with in this Minute.

2. Before explaining what this branch is, and why I propose to single it out to be first dealt with, it will be useful to summarize the information now lying before me, and to show what, up to the present time, has been the course of matters in these Provinces, and what, as far as we are informed, has been done in Madras, Bombay and Bengal.

3. The Government of India in its letter of the 16th September 1885 first opened this subject by forwarding for the consideration of this Government a copy of certain papers from Madras (Madras G.O. No. 377, dated 3rd June 1885, and enclosures) regarding a scheme then recently approved by the Madras Government for the development of scientific and technical instruction in that Presidency. The paper was referred, demi-officially, by my predecessor to the Director of Public Instruction, with a request that he would review the state of the matter in the North-Western Provinces. Briefly stated, the Madras scheme aims at promoting technical education in industrial arts and manufactures, by offering grants-in-aid to encourage the teaching, in schools so aided, of technical science, arts and handicrafts, and by testing that teaching by a system of public examinations. The immediate object of the scheme is to open up some other employment than public service for educated persons of country birth. A School of Arts, an Agricultural and an Engineering College exist already at Madras, where technical instruction of the above kind can be imparted; but the aim of the scheme embodied in the papers forwarded was further to create and encourage technical instruction in Middle Class schools.

4. On the 23rd July 1886 the Secretary to the Government of India in the Home Department forwarded a "Note" drawn up in that Department on the subject of technical education in India, adding that the Government of India wished to learn whether the suggestions made therein met with the concurrence of this Government, and if so, what steps, having due regard to financial considerations, the Lieutenant-Governor would propose to take, in order to give effect thereto. In paragraphs 24 *seq.* and *seq.* 49 of the Note were

summed up the facilities now existing in these Provinces for technical training: the conclusion drawn being that "on the whole it may be said that there is room for improvement in all branches of technical training in the North-Western Provinces and Oudh." The Note was forwarded to the Director of Public Instruction, the Director of Land Records and Agriculture, the Inspector-General of Civil Hospitals, and the Secretary to Government in the Public Works Department; and the opinions of the two latter were invited especially in connection with the Agra Medical School and the Roorkee College, after consulting any officers whose opinion they might consider of any value.

5. The Director of Public Instruction replied on the 9th January 1888 to the above letter. He pointed out that the question of establishing faculties of Medicine and Engineering was under consideration in the Allahabad University, which was also considering the preparatory course of study to be required from students desiring to matriculate, and the course for degrees in the faculties of Law and Arts. He added that the application of the sum subscribed in Oudh for the establishment of an institute for technical education (an incident which has been mentioned in the first paragraph, and will be referred to later in the course of this Minute) had brought the question in these Provinces to a practical issue. He had written to the Superintendent of the Arts School at Lahore for information regarding the expenditure connected with that school. He proposed that the question of agricultural and veterinary schools should be referred to the Department of Land Records and Agriculture, as also the teaching of land surveying. With regard to the instruction of drawing in Government and aided schools, he promised a separate report: "But I would note here," he added, "that nothing can be done until drawing masters can be entertained to teach the pupil teachers at the Normal Schools." The suggestion that instruction in introductory science should be made a compulsory part of the secondary school course was one, he considered, which must be left to be decided after the University Entrance Standard had been fixed and could be best determined by the University itself. He briefly referred to other points brought forward in the note sent by the Government of India, and summed up his recommendations.

6. Colonel Forbes replied on the 15th January 1888, with regard to the question referred to him concerning instruction in Engineering. He considered that the practical instruction gained by natives at the large railway workshops at Allahabad, Lucknow and Lahore, and at the Government Workshops at Roorkee, is now bearing fruit at Delhi, where there are at present 17 foundaries and

mechanical shops: one with a 20 horsepower engine worked entirely by natives, without European supervision; at Roorkee, where there is a small foundry and shop under Native management; at Meerut, where there are two native foundries and shops, and at other places. The headmen of these shops, he wrote, and a good proportion of the workmen, received their training in the railway or Government workshops, which may, therefore, be considered the real technical schools where these men were educated in the practical working of their art. He thought it, therefore, unnecessary for the Government in these Provinces to start schools for technical Engineering. Facilities might be given, he concluded, by Government to a limited number of selected students of the Middle or High schools, to go through a four or five years' course of practical work at a railway or Government workshop, but beyond this he would not go. He forwarded the opinion of Colonel Brandreth, the Principal of the Thomason College, and of the late Colonel Ward, Chief Engineer to this Government. The former wrote that he was unfavourable to any school for technical education for the youthful masses, but would provide special opportunities for exceptional young men, though such opportunities need only be very limited in number. "For the higher grades of Engineering, I think the ordinary liberal education with a scientific learning is most suited, until a man is of an age to know his mind, and elect for the profession, when there should be a strictly technical education for a limited time: two or three years, followed by a careful apprenticeship on works." Colonel Ward contended that facilities should be given at the Roorkee College for practical instruction, in addition to the present theoretical course. If such a technical practical class were formed at Roorkee, students from the schools might be allowed to attend it without going through the College theoretical course. He thought, therefore, it would be a great advantage to the young men of these Provinces to divide and treat the Middle and High Schools as suggested in paragraphs 85 to 88 of the Government Note.

7. The Director of Land Records and Agriculture forwarded his opinion on the 16th January 1888. He pointed out that surveying and mensuration are largely taught in the schools under the Educational Department; and that we have also in every district in these Provinces a school of practical surveying, primarily for the instruction of patwaris and patwaris' sons, but open to all classes. He advocated the creation of a Normal school for survey only, at Cawnpore or Lucknow. He also pointed out that lads were trained in horticulture at the Saharanpur and Lucknow Gardens, and that the supply was unequal to the demand: at the Cawnpore Farm also a

few apprentices are in training, several of whom had subsequently found good places, their services being much appreciated. He advocated small scholarships for the maintenance of boys in training at the various workshops in the Provinces; the establishment of an Art School at Lucknow; of agricultural and veterinary schools or classes in High schools; he proposed that drawing should be made compulsory; competency to teach drawing being prescribed as an essential qualification in all teachers in Middle and High class schools.

8. Dr. Rice, the Inspector-General of Civil Hospitals, also reported on the 19th January 1888, disapproving the proposal to teach up to a higher standard than that of the Hospital Assistant class in these Provinces. One or two Assistant Surgeons yearly, he wrote, meet all our wants in this direction; who can be educated as at present at Lahore, where we sent five students yearly, two of them receiving stipends from the North-West Government.

9. On the 19th March 1888 the Director of Public Instruction again reported, expressing an opinion adverse to the establishment of a School of Art at Lucknow; and on the same date he submitted a further report regarding the introduction of drawing into public schools, of which, briefly, the burden was that, however desirable the proposal, there were no funds; but that if funds could be provided for introducing drawing into the zilla and public elementary schools he would prepare a scheme.

10. On the 11th December 1888 the Director of Public Instruction forwarded a Resolution of the Senate of the University of Allahabad; practically to the effect that at present any steps to establish a College for training medical practitioners would be premature.

11. On the 15th February 1889 he forwarded copy of a Minute by the Senate, of the 14th January 1889, in which it was decided to take steps to establish a Faculty of Engineering. Colonel Forbes, whose proposals were adopted by the Senate, proposed that the University should confer a degree on men who had passed at least a three years' theoretical course at a properly constituted Engineering College or School.

12. A note by Saiad Muhammad Husain, M.R.A.C., Fellow and Member of the Faculty of Arts of the Allahabad University, is also among the printed papers. The conclusion he seems to have come to is that the demand for men trained in mechanical arts must

be created before the supply and that at present the demand does not exist.

13. The Registrar of the Allahabad University, on the 30th November 1889, forwarded to the Public Works Department a letter from the Educational Department of this Government (written with reference to the Senate's proposal for the establishment of a Faculty of Engineering at the Allahabad University), enquiring what facilities are already in existence in the provinces for studying the subject for which a Engineering degree would be conferred, and what facilities would be likely to be called into existence should such a faculty be established.

14. This file is still under the consideration of the Public Works Department, which is engaged in obtaining the information required, but has not as yet replied to the Registrar's letter. It is, therefore, premature to include in this Minute any final information on the subject: but so far as can be gathered from the papers before me, the only place at which Engineering can be studied in these Provinces is Roorkee; and if a Faculty of Engineering be established no facilities would be provided for studying Engineering which are not provided at the cost of Government: so that Roorkee would supply all the candidates likely to present themselves. The Public Works Department is, as at present informed, I believe, of opinion that if degrees are conferred by the Allahabad University the Roorkee certificates for Roorkee students should be abolished; but it prefers Roorkee certificates. Pending the consideration of this matter by the Government of these Provinces, the Resolution of the Senate regarding the establishment of an Engineering Faculty has not been forwarded to the Government of India.

15. The establishment of what has been described as "a special examination of a commercial and practical character" by the University is also under consideration. This belongs to the class of what may be called general measures for the furtherance of technical education, rather than to the immediate practical section of the inquiry. It aims at giving a preliminary instruction, without which no large growth of technical education can be hoped for: but it is a measure of which the effect can be felt only after the lapse of a considerable time, and the disposal of the immediate section of the question under consideration need not await final decision on this point. All that we have to be careful about now is that any measures that we may decide upon should be in conformity with the alternative standard scheme; and capable of such expansion as may harmonize with the principles likely to be embodied in any decision which is ultimately come to.

16. It is unnecessary, in view of the above remarks, to enter at any length into the present state of the special University examination question. It will be sufficient to state that the Government of India, in the Home Department, on the 18th September 1888, addressed this Government regarding the recommendation of the Education Commission, that in the upper classes of High schools there should be two divisions, one leading to the entrance examination of the Universities; the other of a more practical character, intended to fit youths for commercial or other non-literary pursuits. The Government of India considered that no method could be wholly satisfactory, under the existing circumstances, if the University does not co-operate by establishing the alternative examination suggested by the Education Commission, and thus enforce that bifurcation of studies to the adoption of which the Government of India attaches the greatest importance. This Government was, therefore, asked for its views as to the best method of establishing an alternative standard for the University Entrance Examination. It was not contemplated that the present arts standard of entrance examination should be altered, but that another and an alternative standard should be established. The question having been referred to the University, the Registrar forwarded to this Government, in November last, a scheme which the Syndicate, after consulting the Faculty of Arts, were prepared to recommend to the Senate at the University annual meeting on the 30th January 1890, which would, if carried, meet with the wishes of this Government. This Government addressed the Government of India, forwarding the scheme submitted by the Registrar with its own remarks. The Government of India has lately replied, and their letter has been sent to the University for consideration.

17. The above *resumé* disposes of the hitherto correspondence directly connected with technical education, and brings out what may be considered the preliminary points which must be dealt with before the subject is more intimately approached. We find that a considerable number of the suggestions of the Government of India are either not thought desirable in these Provinces, such as the organization of a School of Arts; or, like Veterinary and Higher Medical schools, are not urgently needed in view of the facilities given in neighbouring Provinces; or have already practically been put into effect: such as in the case of the teaching provided by the School of Forestry, or the survey instruction given at the patwari school. We find the railway and other workshops giving practical education to a large number of artisans: and we thus get nearer to the heart of the subject by narrowing the points on which instruction seems to be required. There is seen to exist much difference

of opinion as to the course which should be followed in these Provinces; but, on the whole, opinion points to the expediency, in the opinion of those consulted, of giving greater facilities for obtaining instruction in the subordinate grades of practical Engineering, and in the handicraft of the artisan.

18. We thus approach the aspect of the question which more immediately presents itself, namely, the measures to be adopted (subordinate to any larger scheme for developing further technical education in these Provinces, such as that of a special University examination, and bifurcation of studies in the Zila or Middle class schools). Before, however, dealing with this subject, the offer of the British Indian Association to establish a Jubilee School of Industry at Lucknow must be recorded. In July 1887 the British Indian Association, through its President, forwarded to the Government a Resolution of a meeting of the Committee of that Association, held on the 14th February 1887, to the following effect: "That a School of Industry be established and maintained at a cost to the Association of Rs. 500 per month; that one of the Wingfield Munzil building be set aside for the proposed school; that it be called the Jubilee School of Industry, to commemorate the auspicious Jubilee of the fiftieth year of the reign of Her Imperial Majesty; that the Commissioner of Lucknow be requested to obtain from the Government and the Local Municipal Board contributions towards so great and useful an object; that the management and control of the School of Industry, when opened, be vested in a Committee of the Talukdars to be appointed for the purpose; that with the permanent monthly grant made by the British Indian Association of Rs. 500, and of one of the Wingfield Munzil building roughly valued at a lakh of rupees, subsequently supplemented by equally liberal contributions by the Government and the Local Municipal Board, the School of Industry will make a fair start, and that it is also expected to receive liberal support from the princes and nobles in different parts of the country, and such of the jubilee scholarships as may be available." The Government assured the Association of its sympathy and support, and asked them to nominate a Committee for the consideration of the subject and to draw up a working scheme.

19. I find next a collection of papers on the establishment of the proposed technical school at Lucknow, which was forwarded to this Government by the Director of Public Instruction on the 30th April 1888, which has, apparently, remained without orders. It contains the Resolution above quoted and the reply of this Government. The proceedings of a meeting held on the 6th August, 1897,

follow, the result of which was the formation of a General Committee; next are the proceedings of the 3rd October 1887, the most important feature of which was the announcement by Munshi Imtiaz Ali that in addition to the subscription of Rs. 500 a month by the British Indian Association, and the grant of the Wingfield Munzil building, individual subscriptions had been offered; and a list of these is then given, amounting annually to Rs. 17,440. The next paper is an abstract of a speech of Sir A. Lyall regarding the technical school, delivered at Lucknow on 5th November 1887, in which he merely refers to his pleasure at finding the question of a technical school adequately taken up by the Talukdars. There follows an extract from the address presented to him on the 7th November, in which a detail of the subscriptions is again given, with an expression of the hope that they will suffice at the outset to work out the proposed scheme for a technical school, "on the successful accomplishment of which the material prosperity and intellectual, moral and social progress of our country depend, and from which great advantages will doubtless result both to the Government and the people." It was hoped that further liberal support would be received both from the Government and from private individuals. The scheme was finally referred to by Sir A. Lyall, at the opening ceremony of the Allahabad University, on the 15th November 1887, in which he said that their liberality and public spirit deserve all possible recognition and aid by the University, but that their whole scheme must be carefully worked out before it could be seen whether the school could be organized in connection with the University.

20. The final paper in the collection is a letter from the British Indian Association to the Commissioner of Lucknow, dated 15th December 1887, forwarding proposed rules regarding the constitution and management of the Association for the encouragement of technical education, and the establishment of a school of Arts and Industries at Lucknow. The rules merely concern the conduct of business by the Committee, and have nothing to do with the actual furtherance of technical education.

21. Before taking into final consideration the steps to be adopted in order to develop the technical education at present existing in these Provinces, I requested the Bombay and Bengal Governments to forward to me any papers showing the form which the scheme had taken there, and they kindly sent me a valuable collection. The Resolution of the Bombay Government of the 15th September 1886 explains the material existing to their hand in Bombay, and the

methods adopted by the Government to work it into shape. It is not necessary that I should recapitulate its contents.

22. The report of the Victoria Jubilee Technical Institute of Bombay, from its commencement to the 10th April 1889, has also been forwarded to me by the Bombay Government.

23. The Bengal Government have forwarded a selection of papers on technical education in Bengal; and (what seems to have been the chief outcome of discussion on the matter in that Province), the Proceedings of that Government in regard to maintaining the Seebpore Workshops on a smaller scale. In the latter collection of papers is a valuable letter, dated the 20th February 1889, from the Director of Public Instruction (Sir Alfred Croft), to the Bengal Government, reviewing the Report of a Committee which had enquired into the question, and embodying his own conclusions. Paragraphs 16, 21, 22 and 23 of that letter are appended to this Minute.

24. From a study of the above papers, and from consideration of the subjects, in all its aspects, it is clear that before we attempt to give form to any scheme for extending technical education in these Provinces, we must answer to ourselves the definite question as to what, in these Provinces, we propose to understand by technical education. What is understood by technical education now-a-days in Europe may be best illustrated by Mr. Scott Russell's words embodied in the 2nd paragraph of the Bombay Resolution of the 15th September 1886, *viz.*; "It is necessary that each individual shall, in his own special profession, trade or calling, know more thoroughly its fundamental principles, wield more adroitly its special weapons, be able to apply more skilfully its refined artifices, and to achieve more quickly and economically the aim of his life, whether it be commerce, manufactures, public works, agriculture, navigation or architecture." It is also formulated in Mr. Kirkham's Report, dated 8th February 1887, to the Bombay Government: "The general principles that the real technical school is the actual workshop—that actual workshops are only called into existence by capital operating in accordance with its own law—that this training, so far as it can be given in schools or colleges, must be, in the main, preparatory and disciplinary, and that the improvement of science teaching all round and the spread of a practical knowledge of drawing are the indispensable preliminaries to any form of practical training—these and the other similar principles enunciated or suggested in the

Resolution of Government may be considered as fundamental data accepted with practical unanimity by the authorities on the subject in England." Mr. Kirkham admits that "on both sides of the line of practical action there is every degree of diversity of opinion." The aim of the Bombay Government has been to supply practical instruction in the city of Bombay with a view to raising the standard of existing industries and of preparing the way for other useful developments. Raising the standard of existing industries being the aim, the question arises—What are the chief existing industries in Bombay? Cotton mills and railway engineering, is the reply. What is required, therefore, it is said, is an institution located in the district where the mills are, and near the railway workshops, and that in this institution instruction should be given in such sciences as are necessary for the practical requirements of the managers and foremen on the one hand, and of the skilled artisans and mechanics on the other. The scheme ultimately adopted is probably far beyond anything that we can accomplish in these Provinces, but I quote the views of the Bombay Government as illustrative of the lines in which they propose to work, which seem to me to be identical with those which we should also adopt in these Provinces. We have a variety of arts and handicrafts in existence, which have existed from time immemorial; many of these have of late years, owing to demand in the market in Europe, and to the individual efforts of officers in these Provinces, received great encouragement. The aim of the schools of arts has been, among other matters, to assist in the improvement of these industries. On the one hand, however, experience has shown that our efforts, so far, to improve these arts and industries have not been so successful as to encourage us to devote any considerable funds to further attempts in the same direction, carried out on the same lines; while, on the other hand, the extension and growth of our rule in India has led to the introduction of certain industries which are not (like those of which I have spoken) what may be called caste industries, but industries owing their existence in this country to the introduction of British rule. These industries are, therefore, not taught by father to son, nor are they the property of guilds such as are the industries of carpentering and weaving, and so on in India: but they are nevertheless likely to take a great extension and to provide employment for an annually increasing number of artisans. It is, therefore, peculiarly the interest of the English Government to provide for the instruction of those who desire to be engaged in these industries, and to create every facility for increasing the number of those who may so desire. It is from this point of view that I have approached the consideration of the measures now to be adopted.

25. In Bengal Sir Alfred Croft wrote:—

“The abolition of the workshops at Seebpore is, in fact, a proposal which I view with the gravest misgiving. It is not altogether free from objection even as regards the engineer and overseer classes. Mr. Spring has pointed out that the theory of the steam-engine, for example, should go hand-in-hand with practical instruction, and that the principles of the utilization of heat, of which engineer students have been found to have an imperfect grasp, should be regularly illustrated by tests and experiments on engines actually at work in the shops. Again, he remarks that the art of making neat and rapid free-hand sketches is an essential acquisition for every engineer and mechanic, and that the shops at Seebpore offer ready facilities for acquiring it. Still, these are details. The important point is that at some stage of their course engineer students should learn the use of their hands; and this point is secured by the proposals of the Committee. I may again be permitted to quote Mr. Spring as to the importance of such training to an engineer. ‘There can be no question,’ he writes, ‘as to the superiority for Public Works employment of the men who have gone through the course of manual training. There are many reasons for this, undoubted superiority; some of them are practical and other moral. An engineer who has learned to use his hands is, other things being equal, an all round better and more useful man than one who has not. The average young Englishman of the present day, especially if he has *con amore* adopted engineering as his profession, has, since his childhood, been in the habit of more or less using his hands. If he has no more than driven nails, whittled sticks with his pen-knife, and tinkered up a dog kennel out of old planks, he is to that extent more handy than ninety-nine out of a hundred India-bred boys, European or native, who would never dream of so far demeaning themselves, as they would consider it. We have now found out, as the result of eight years’ experience, that Indian boys of every race and of every caste will use their hands and work at the lathe and at the bench alongside of artisans, for the sake of the possible chance of the very valuable prize of a permanent appointment in the engineer grades of the Public Works Department.’

“There is no ground therefore for taking exception to the Committee’s scheme so far as it relates to the training of engineers. It is with respect to the needs of the mechanic class that I find the proposal to remove the workshops most open to objection. This is the department of the College to which Mr. Spring at any rate attached the greatest importance. I quote the following extract from various notes which he has written on the Seebpore College:—‘The students are passed through a five-year course of technical training, in which a sufficient knowledge of theory, drawing and surveying is combined with a very good practical knowledge of workshop methods and practice in the use of hand and machine tools. Ex-students of this class almost invariably succeed in obtaining remunerative employment, and complaints are frequently heard of the difficulty of obtaining their service—at all events in the Public Works Department. They are a thoroughly well trained and useful class.’ Again—‘The second, or mechanical overseer class, is a most popular and successful class. Large as this class at present is numerically (about 80, I believe, in average years), it is important that it should even be larger. There is an annually increasing demand in India for men competent to take charge of engines and machinery. The owners of the jute mills are, I believe, generally unaware that this class of superior artisan is

systematically trained at Seebpore. The majority of the passed apprentices of the College find employment on the numerous inland river steamers and in charge of portable engines.' And again—'I would even go so far as to say that, in view of the possible great future of Seebpore as a technical school for the training of artisans and foremen, it would, in my opinion, be a wise move to, after a while, cut the *College adrift altogether* from its engineering class, so as to allow of the higher professional staff devoting all their energies to what I look upon as by far the most important, as it has hitherto, in spite of many disabilities, been the most successful class, that, namely, for the training of foremen..... There is ample scope for the employment all over India of very large numbers of this most excellent class..... They at present obtain employment as fast as the College can turn them out, and for want of more of them we are compelled, in the practical departments of the public services, to frequently employ all manner of half-trained loafers. Good men of this class, who have had four or five years' practice, can always command from R 100 to R 200 a month. There is ample scope for their employment in tea gardens, on river steamers, in mills, in workshops, on our public civil works, with contractors and with building firms; in the Survey and Telegraph Departments; in hundreds on our railways; in the Agricultural and Court of Wards' Departments; on irrigation works, and generally wherever a trained intermediary is required between skilled labour and its employer."

"The Department described in such terms is the one whose future success, if not its very existence, seems to me to be jeopardized by the proposals of the Committee. It may be freely admitted and taken as proved that the maintenance of the shops is undesirable from the point of view of the Public Works Department. But it is no less clear to me that the interests of that Department are in this matter antagonistic to those of technical education; and that the deliberations of the Committee have been chiefly governed by regard to the former. Indeed there is something obviously defective in the idea of a technical institution for the training of mechanics from which everything of the nature of manual instructions is excluded. We are brought back to the time when the Civil Engineering Department was a branch of the Presidency College; and all the efforts made in the past ten years to carry out the modern idea of technical instruction, in which theory and manual work are combined, will have been made in vain. The workshops being removed, there is no longer any reason why the Engineering College should remain at an inaccessible place like Seebpore; and consequently all the expenditure incurred on buildings has been money thrown away. I am fortified in these opinions by the authority of Mr. Spring, whose interest in and knowledge of the subject are too well known to make it necessary for me to apologize for quoting him frequently in opposition to the Committee's views. Mr. Spring writes—'In view of the necessity, under the law, for mechanical foremen, who are likely to have charge of the engines of inland steamers, putting in a five-years' apprenticeship in workshops, it is in my opinion essential that workshops in one form or another should be maintained in immediate proximity to the College. The subject is a difficult one; but in spite of its difficulty it must be properly taken in hand and settled upon some satisfactory basis, unless the Government of Bengal is prepared to entirely give up the principles enunciated by them when the Seebpore College was first founded. The mechanical foreman students must be apprenticed to the

superintendent of workshops of some description or other, and these workshops must be situated in close contiguity to the College. If it is settled that the final two years of the five shall be spent under proper supervision in great outside shops, there is no longer any real necessity for maintaining the Seebpore shops upon their present scale. They must, however, be *bona fide* shops where real work will be done.' In fact, the question for the Government to consider, in dealing with the removal of the workshops from Seebpore, is whether they will 'entirely give up the principles enunciated by them when the Seebpore College was first founded': that is to say, whether they will give up the combination of class-work with manual work, which was intended to make the workman a man of his head as well as a man of his hands. I am informed that in the East Indian Railway workshops and in the Port Commissioners' dockyard an apprentice is taught only the manual part of his trade, and is left to pick up his theoretical knowledge as best he can. I am aware that this practice is defended by many men of experience, and it is pointed out that the dockyard apprentices do somehow manage to acquire the learning needful for them, since they pass the examinations prescribed for marine engineers. Still, the almost unvarying testimony of modern authorities on technical education commends systematic instruction during the period of apprenticeship as the more excellent way; and that is the principle on which for ten years we have proceeded."

26. The Bengal Government wrote on Sir Alfred Croft's letter as follows:—

"The Lieutenant-Governor considers that the workshops, which are no longer required by the Public Works Department, and, as now conducted, are very expensive, cannot be maintained permanently on their present footing. They are, moreover, not fully adapted to the purpose of technical instruction. But their abolition involves the complete abandonment of the principle upon which the Seebpore College was founded, that theoretical and practical instruction should go hand-in-hand, a system which has worked well hitherto in regard to the overseer class, the largest and most successful in the College. This principle the Lieutenant-Governor is not willing to give up without being fully satisfied as to the possibility of providing an efficient substitute in the manner proposed by the Committee, by instituting a system of apprenticeship at public and private workshops; and even such a system would possibly require to be supplemented by the maintenance at the College of a small workshop or 'mechanical laboratory' such as to give the pupils, from the outset, some familiarity with the practical use of tools. It, moreover, appears that, as indicated by the Director of Public Instruction, the course proposed by the Committee is too long, especially in the case of mechanics, many of whom would be unable to spend four to seven years on their training. The Lieutenant-Governor accordingly proposes to reserve orders on the points specified in the ninth paragraph of this Resolution pending the issue of an inquiry ordered by the Government of India by way of a technical survey of existing industries in Bengal. The officer deputed for that purpose will be required to report how far apprenticeships can in fact be secured for passed students of the College on such terms as to ensure for them a practical training not inferior to that which they at present receive at Seebpore. Some enquiries on this point have already been made by the Public Works Department, but these will require to be supplemented by more exact information, and on receiving a complete report the Lieutenant-Governor will be able to decide finally on the course to be adopted."

27. Finally, the Government of India, concurring with Sir Alfred Croft and the Government of Bengal, wrote—

“In regard to the second question, I am to say that His Excellency in Council entirely concurs in the views of the Director of Public Instruction, Sir Alfred Croft, which it is understood also commend themselves to His Honour the Lieutenant-Governor, regarding the impolicy of abolishing the Seebpore workshops. Everywhere in India the promotion of technical education is now receiving attention, and the desirability of associating theoretical with practical training has been generally recognized.

“There exists in the Seebpore workshops the nucleus of a technical institution, the value of which would be seriously affected by disassociating the practical from the theoretical training of the College. The Governor General in Council doubts if any valid inference can be drawn from the state of the attendance rolls unfavourable to the prosecution of the experiment; and he attaches no great weight to the argument that hitherto the school has not been a financial success. He thinks the importance of the interests involved call for perseverance in the undertaking and he would be glad if, with a view to improving the opportunities for practical instruction afforded by the school, it was arranged that some of the work of the Public Works Department should continue to be undertaken at the Seebpore workshops, and local boards and other bodies were encouraged to patronize the institution in a similar manner. I am to add that the Governor General in Council would further suggest for consideration whether scholarships, tenable at the Seebpore College, may not be established by district and municipal boards for the education of youths who might be placed under contract to serve afterwards for a certain period on district works. If, as appeared in the case of the Lady Dufferin Fund, there still be doubts as to the competency of district or municipal boards to establish such scholarships, the law should be so altered as to remove these doubts.”

28. I have discussed the subject with Mr. Wickes, Secretary to the Government in the Public Works Department, and Mr. Holderness, Director of Land Records and Agriculture, and I have undertaken to put down the conclusions at which our discussions seem to point as a basis for the further inquiries, in which both those gentlemen have promised to assist me. It is impossible, with our present knowledge, to formulate any scheme, and we were agreed that whatever was done at this stage, should be done with the view of obtaining competent criticism and advice on the outlines of our proposals. It seemed to us probable, after such inquiries as we have been able to make, that the railway, Roorkee, and other workshops provide sufficient training for the mere artisan, and that his training may be left to them. We agreed, I think, that what seems mostly needed at present, in these Provinces, in the matter of technical education, is the provision of greater facilities for a somewhat higher class of training in those new mechanical industries which have been introduced by British capital into these Provinces, and in regard to which, though there may be a growing demand for skilled

labour, there is no indigenous source of supply. We are not, however, in a position at present to say what is the effective demand for men competent to deal with machinery, and familiar with at least the lower forms of engineering; and this is a point on which further inquiry is necessary. Assuming, however, such a demand to exist, the problem before us would be to decide—

- (1) what direction such training should take;
- (2) how best to secure it; and
- (3) the sources from which the necessary funds could be obtained.

29. With regard to the first point: what would seem mostly to be required are facilities for gaining a competent theoretical and practical knowledge of the more subordinate grades of mechanical engineering, such as is necessary to a foreman mechanic, more specially in connection with the steam engine, the railway workshops, and the iron foundry; and also of the processes of cotton spinning as employed in the mills established in these Provinces. These are the two great branches of Industry which in Bombay have been recognized as fields for native labour; which, though in a lesser degree, exist here; and in regard to which, at present, specialized means of instruction are unquestionably, in these Provinces, wanting. With regard to the second point, there exists at Roorkee a Government Engineering College and Government Workshops, and it seems probable that we have here, subject to such further development as may be found necessary, the nucleus of the instruction necessary. The staff of the College, as at present existing, would possibly have to be enlarged, and a special class established for students seeking the special kind of technical instruction we should be desirous of giving; but the present course of the College, to a great extent, would be followed by all classes of students. The workshops might also require to have material added to them for such purposes of practical instruction as may be combined with theoretical instruction. Some small addition to the staff might also prove necessary. The Roorkee Workshops already instruct a certain number of apprentices every year, but these apprentices are of the class of artisans or simple mechanics, and not of the class of foreman mechanic for whom instruction in these Provinces may be found necessary if it be shown that there is a demand for such a class. The railway workshops similarly give training to a large number of the humbler class of mechanics, who bring with them, however, as a rule, no previous education whatever.

30. Prior to admission to such classes as we propose, it would be necessary to establish some such test as 'the anglo-vernacular middle class, to ensure some tolerable knowledge of English, and as a guarantee of the good faith of those who sought for instruction. A three or four years' course of instruction, theoretical and practical, would be required, which would possibly include a term of practical training in the railway workshops and the cotton mills. The proposal which seems to us at present most practicable is, that a certain number of scholarships should be given to be competed for by students desirous of entering the College, and that the holders of the scholarship should, by means of them, be enabled to pass through their course of instruction, whether at Roorkee or (as part of their course) in attendance at workshops or mills.

31. Two points, however, presented themselves, on which further information is necessary before any decision can be come to on the above project. In the first place, we wish to learn the opinion of railway authorities and of gentlemen who are employers or directors of mill hands, as to whether there is a field of employment for natives trained in the kind of theoretical and practical education we propose to give them; that is to say, as foremen mechanics, not as mere artisans; and, whether for the present the means of instruction for the ordinary artisan are sufficient; and, if not, what steps are possible, in view of the means at Government command, for improving that instruction. On that point Mr. Wickes and Mr. Holderness respectively have consulted railway and mill employers and directors, but the information they have obtained is as yet incomplete. We have, for example, been assured by gentlemen competent to form an opinion that all which is required is the establishment of night schools for the elementary instruction in mechanics of the artisans at present employed in the railway and other workshops; and that there is no demand in these Provinces for native foremen mechanics.

32. Assuming that the class of instruction we propose is that which is most desirable, it will be necessary to learn whether the railway and mill employers are willing to allow students who are following the course indicated in this Minute, to go through a practical training at their several establishments, should that be considered necessary, and, if so, under what conditions and on what terms.

33. The question of funds is one into which it is at present, and until the dimensions of the scheme are decided will remain, premature to enter. It is probable that there would be some not

inconsiderable initial outlay on the necessary additions to the plant at Roorkee Workshops, and possibly to the students' accommodation at Roorkee, as well as permanent charges for the tuitional staff and scholarships. It is premature further to follow this part of the question until we have satisfied ourselves that the bases on which we propose to build are practical.

34. The first point really needing solution is: are there grounds for believing that facilities for such instruction as will provide competent men of the class of foreman mechanic, are what are mainly required in these provinces in order to meet a demand, and at the same time to furnish employment for natives desiring such means of livelihood? Secondly, if this is so, have we reason to believe that duly competent judges (employers of railway and mill labour, for example) approve the system of instruction sketched out in this Minute? Thirdly, what light can the Educational and Workshop authorities at Roorkee throw on the proposals put forward by us: that is to say, what material contribution can they bring towards the settlement of the special question connected with the class of education which it is proposed to give?

35. In order to obtain what information is available to us on the above points, I have decided to appoint a Committee composed of Mr. Wickes, Joint-Secretary to this Government in the Department Public Works; Mr. White, Director of Public Instruction; Mr. Holderness, Director of Land Records and Agriculture; and Mr. Izat, Manager of the Bengal and North-Western Railway, who has very kindly consented to assist the Committee, and to lend me, so far as they can be spared from his own duties, his services in the proposed inquiry. A native gentleman will be added to the Committee. I should wish the Committee to obtain from all available quarters full information on each of the above points; to depute one or more of its members, if it thinks necessary, to Calcutta, Bombay or Madras, in order to see what can be utilized by us in the experience gained by the working of the technical institutions at those several towns; and to submit to me, so soon as they are completed, the result of its inquiries, with its own recommendations, and a full and detailed statement of the scheme which it desires to see carried into effect.

36. I shall be glad if one or more members of the Committee would, more particularly while at Madras, where I understand that the subject has been especially studied, inform themselves of the measures taken there, and the progress made, in the direction of

improving the *technique* of handicrafts, whether by teaching hand-drawing, or by the use of better tools, or by whatever other methods they may find to have been adopted. This part of the subject should be separately studied by Mr. Holderness, Mr. White, and the Native member of the Committee, with special reference to the Lucknow scheme referred to in this Minute, and a separate report should be submitted. The efficiency, so far as Madras or Bombay have been concerned the utility, the cost, and the applicability of such a scheme to arts and industries as existing in Oudh and the North-Western Provinces are points to which attention must be especially directed.

37. It may, finally, be desirable to publish this Minute in the *North-Western Provinces' Gazette* both to let the public know what is the present position of the matter in these Provinces, and in the hope of obtaining practical aid and suggestions from those who are competent to give them.

NAINITAL;
The 8th September, 1890. }

A. COLVIN.

[*Home-Education A Proceedings, December 1892, No. 50; Papers relating to Technical Education in India (1886—1904), pp. 123—31 (Calcutta, 1906).*]

EXTRACT FROM RESOLUTION ON TECHNICAL EDUCATION DATED, 7TH SEPTEMBER 1894

Study of drawing and introductory science suggested in all middle and high schools—progress of technical instruction in various states reviewed—agricultural aspect of technical education discussed.

* * * * *

IT has for long been accepted that the educational system should comprise a secondary school course which should fit boys for industrial or commercial careers, and the need from a trade point of view of industrial education for developing the resources of India has also been recognized. Technical education is, therefore, supported by the Government of India as an extension of general education, and industrial education is countenanced so far as it is of a nature applicable to the service of existing industries. The Government of India, in reviewing Sir A. Croft's Report, suggested that schools of drawing and design might be attached to the principal railway workshops, and that in large towns there would probably be found an existing demand for superior skill in industries. Local Governments were enjoined to carry out on an early opportunity industrial surveys which should ascertain particulars as to all important local industries, and to appoint committees of educational experts and professional men with a view to their recommending alterations in the system of public instruction according as the requirements at local centres of industrial progress might render advisable. Chapter VIII of the present Report deals with the subject of technical education. The Note prepared in the Home Department in 1886 recommended that drawing and introductory science should be studied in all middle and high schools; that there should be a practical or "modern" side in high schools; and that a "modern" University Entrance examination should be adopted as recommended by the Education Commission. It was suggested that special schools in the various departments of Arts should be established; that a technical branch to teach and improve a local industry should be attached in some places to middle and high schools; and that the whole body of technical institutions should be systematized and placed under central colleges to be affiliated to the University.

15. Drawing is now taught in all training schools in Madras, and special inducements are offered to all teachers to qualify in drawing; but it has not been made a compulsory subject of study in the schools. Elementary science is compulsory in high schools, and can be studied in middle schools. In Bombay drawing is taught in all Government high schools and Training schools; and, though it has not been made compulsory, the number of students of drawing has very greatly increased. Some branches of elementary science are required for the Matriculation Examination, and are therefore compulsory in High Schools; and an examination alternative to the University Matriculation Examination has been instituted. It does, however, not lead up to a University curriculum; and on the point as to how far its character is modern and practical, as also regarding the projected appointment of an instructor of science to every High school, the information is defective. In Bengal drawing has been made compulsory in Training schools, but its introduction into schools generally is still in the experimental stage: introductory scientific instruction has long been imparted in Upper Primary, Middle, and High schools. A modern side has not been established in High schools, as the Local Government considers it impracticable to effect this change until the Senate of the University will consent to establish an alternative Entrance examination in practical knowledge. The University of Allahabad has agreed to establish an alternative final examination for High schools, which may also be a Matriculation examination for those who purpose to study science. The general appointment of drawing teachers in the North-Western Provinces and Oudh has been suspended until funds become available for the establishment of a School of Art. Neither drawing nor science is a compulsory study in the schools in the Punjab; but the University has determined to hold an alternative Entrance examination in practical knowledge, and also a clerical and commercial examination which will not lead up to a University course. In the Central Provinces drawing has been made compulsory in Primary schools and optional in Middle schools. Physical science is compulsory in Government Middle schools, and lessons on common objects are given in Primary schools. Manual training has been introduced, but it has been found advisable to render it optional only. In Burma drawing has recently been made compulsory in Government and Municipal schools. In Assam the subject appears still not to be taught: a certain amount of science is taught in Middle and High schools.

16. Passing from what are considered the preparatory stages to technical education itself it is remarked that amalgamated rules were published in Madras at the beginning of 1893. The rules

prescribe examinations of three grades: elementary, intermediate, and advanced; the subjects embraced being Engineering, Physical Science, Geology, Biology, Sanitary Science, Agriculture, Veterinary Science, Commerce, Music, Drawing, and the work of various trades (Jeweller's, Printer's, Shoe-maker's, Lace-maker's, Cook's, etc.). Diplomas and certificates are awarded for passing at once in several of the subjects. The system is one of testing rather than imparting knowledge, and departs from the intentions of the Government of India in dealing directly with the actual work of various trades. Mr. Havell, Superintendent of the Madras School of Arts, conducted extensive enquiries, but a complete industrial survey has not been carried out in Madras, nor has agricultural instruction been introduced in Government High and Middle schools; industrial classes have been attached to a few schools. The Victoria Technical Institute, Madras, founded as a memorial of Her Majesty's Jubilee, has an invested capital of Rs. 1,42,000; it is stated that, when the building is completed, a technical library and museum will be opened, and arrangements made by delivering lectures and holding classes to constitute it an Upper Secondary Technical school. Hitherto the Institute's funds have been expended in giving stipends tenable by students at institutions where science and art are taught, and in providing certain lectures. The building referred to is a portion of the Connemara Fort Library building, and after construction is to be placed at the disposal of the Victoria Institute, the Government retaining the ownership. At the Madras School of Art the number of students has risen between 1886-87 and 1891-92 from 265 to 426, and the institution seems to be flourishing and useful. The Government of India are now considering, in communication with the Secretary of State, the position which should be assigned in the educational system to this and the other Schools of Art. The College of Agriculture at Saidapet has been re-organized, but hitherto the number of students shows a decrease. From the account given of industrial schools (often charitable institutions) in Madras it appears that in many of them boys are simply being trained to trades.

In Bombay the "Reay Art Workshops" were in 1890 added to the School of Art, and speedily received numerous apprentices in wood-carving and other artistic industries. The Victoria Jubilee Technical Institute, founded chiefly with subscription to the Ripon Memorial Fund and with money designed to celebrate the Jubilee of the Queen-Empress, was opened to students in 1888. The course was calculated to train a student in three sessions to be a fair mechanical engineer. A large number of students were immediately obtained. The Ripon Textile School is attached to the Institute.

In the Fifth Annual Report of this Institute (which is perhaps the most advanced in India) it is stated that there had been 1,148 students in all during four years, and that all the Textile and many of the Engineering students who had completed the course had found ready employment. The Institute is provided with buildings and apparatus for its Engineering and Textile branches, and is resorted to from all parts of India, and even from abroad; other branches are to be established whenever funds are available. The Bombay Government considered that it had sufficient information about local industries without ordering an industrial survey. The Poona College of Science contains classes in science, engineering, and agriculture, besides classes, independent of the University, for training subordinates of the Public Works and Forest Departments. The numbers in the agricultural classes have somewhat diminished since 1887, employment not being assured to the students. Apprentices in the industrial department have risen from 76 to 110, and more cannot be admitted. Agricultural classes are attached to some of the High schools and to two Training schools. A Veterinary college was established at Bombay in 1886. There were 16 Industrial schools in 1892, besides industrial classes attached to ordinary schools.

The Government of Bengal deputed Mr. E. W. Collin in 1889 to make an industrial survey of the Province. He reported that, generally speaking, the industries were scattered and unimportant. His proposal for a school for mining students is said to be still under discussion. Other proposals by Mr. Collin related to the training of foremen for factories and workshops, and of artisans and mechanics; but he did not recommend the establishment of industrial branches of Primary or Secondary schools. Arrangements for accommodating apprentices to be trained in railway workshops are stated to be under the consideration of the Bengal Government, and a scheme was in 1891 directed to be prepared for the establishment of a silk-weaving school. The number of students of land surveying has risen greatly in Bengal, and they are said all to find employment with ease. The Local Government has raised the qualification for admission to the Seebpore Engineering College and also the maximum age, has provided instruction and machinery to enable the students to undertake larger pieces of work in the workshops than heretofore, and has improved the prospects of the students by the guarantee to graduates in engineering of certain appointments in the Public Works Department. The number of students in the Engineer classes rose from 44 to 87 during the quinquennium. The Calcutta School of Art trains general and engineering draughtsmen, architects, modellers, wood-engravers, and

lithographers. The course of instruction was revised in 1887. The students, who pay Rs. 3 each per mensem as fees, have increased from 152 to 181. Instruction in design is sometimes given in the school, but regular classes for this purpose have not as yet been formed. There are 21 Industrial schools in Bengal; they appear from the later reports received to be more flourishing than was believed by Mr. Nash, and the instruction is not in all of them confined to teaching trades, but the future of these institutions can hardly as yet be regarded as assured.

The Government of the North-Western Provinces and Oudh concluded in 1890 that the chief need was higher training in the new mechanical industries introduced by British capital into the Province. A Committee was appointed to deal with the question of training skilled mechanics. The practical recommendations of this Committee, which chiefly relate to the rules of the Thomason Engineering College at Roorkee, and to establishing a School of Art at Lucknow and certain schools for the children of railway and foundry artizans, are described in paragraph 183 of Mr. Nash's Review. An Industrial school has been opened at Lucknow, and an Agricultural school has during 1893 been established at Cawnpore: the changes proposed in the Roorkee College have been reported to the Secretary of State.

In the Punjab a Committee was appointed which submitted suggestions regarding agriculture as well as other topics, and also respecting the training of artizans. Standards for Industrial schools have been drawn up and grants offered to schools under private management teaching them; all the Industrial schools of the Province are under the supervision of the Principal of the Mayo School of Industrial Art. The number, however, is as yet inconsiderable. A Railway Technical school, intended for the sons of railway artizans, was opened at Lahore in 1889, and speedily filled; a new building has now been erected, costing Rs. 45,000, and capable of accommodating five or six hundred scholars. The aim of the institution is to give instruction preliminary to the practical training of the real workshop. An industrial survey was not carried out, as existing industries are little developed. Design and decoration are said to be well taught in the Mayo School at Lahore, in which the number of students has increased from 82 to 134.

In the Central Provinces an industrial survey was carried out in 1888-89, but the industries were found not to be of such importance as to justify expenditure on technical instruction in connection with them. Fifteen technical scholarships are (it appears from

the Report) offered by the Administration annually, tenable for two years in the workshops of the Bengal-Nagpur Railway. An Engineering class was opened in July 1888 at Nagpur; the students easily find employment, but their number is still small. An Agricultural class was opened also in 1888 in connection with the Nagpur Experimental Farm. The course lasts two years, and includes practical work in raising crops, besides the principles of agriculture, elementary chemistry, and kindred subjects. Dr. Voelcker, Consulting Chemist to the Royal Agricultural Society of England, on visiting Nagpur, considered this to be the best agricultural class he had seen, and ascribed particular merit to the plan of prescribing the practical work of raising crops.

In Lower Burma an industrial survey has been carried out. Grants are offered to aided schools for teaching a number of arts or trades; but, according to the Report, technical training has not been taken up by any of them systematically. Eight stipendiary apprenticeships are given yearly in the State Railway workshops at Insein.

There is little demand for technical education in Assam, and the establishment of certain scholarships to be held by Assam boys attending the Seebpore College in Bengal has been considered sufficient.

17. The agricultural aspect of technical education was considered in the instructive report on Indian agriculture which was prepared for the Government of India by Dr. Voelcker, and his suggestions were subsequently made the subject of examination by two Conferences summoned by the Revenue and Agricultural Department of the Government of India to deal with that report. The conclusions and recommendations made by Dr. Voelcker were thus stated in his report:—

The spread of education will be an important element in the improvement of agriculture. It will do much to remove the prejudices attaching to "caste" and custom which prevent progress in agricultural methods, and it will give rise to a more intelligent farming class.

In a country where, as in India, agriculture is the chief employment, agricultural education especially should be encouraged. Until lately the tendency of education has been in a purely literary direction, and has turned attention away from the land rather than towards it; the fault can now be

best remedied by substituting agricultural education for a part of the present educational programme. The work must proceed simultaneously from above downwards and from below upwards. Elementary instruction should be given in Primary schools by means of "readers" and "object lessons" which introduce familiar agricultural subjects. In Middle schools the elements of physical science, the use of agricultural primers, accompanied by *Illustration Plots* on which the ordinary farm crops are grown, should form part of the instruction. In High schools more attention should be given to physical science and to agriculture, and *Illustration Farms* or fields should be attached to the schools. Agricultural classes should be established where colleges or institutions that especially teach agriculture do not exist, and these should have *Demonstration Farms* attached, and land on which the pupils can themselves work.

Special attention should be directed to the agricultural education given in colleges, in order that the teachers supplied to High schools and to agricultural classes may be well trained men, and that the Land Revenue, Agricultural, and cognate departments may be supplied with subordinate officials who have studied Agriculture, both theoretically and practically.

I do not consider it advisable to establish special Agricultural colleges, but I think that it would be better to utilize existing colleges of science and to form agricultural branches at them. Universities should encourage the study of Agriculture by making Agriculture an optional subject in the course for a degree, and the claims of men who have passed in Agriculture should be fully recognized for appointments in the Revenue and cognate departments.

There is great need of Agricultural text-books suited to the circumstances of the different parts of India, and these should be in the vernacular as well as in English.

That general education be extended among the agricultural classes.

That agricultural education form a part of the general educational system, and be introduced as a prominent subject in the schools of the country.

That text-books on Agriculture adapted to the different parts of the country be prepared as early as possible.

That encouragement be given to the higher study of Agriculture by recognizing more fully the claims of men who have passed in Scientific Agriculture for appointments in the Land Revenue and cognate departments.

Since the submission of these remarks sufficient time has not elapsed for much progress to be made, but there is a general tendency to modify the course of primary instruction which will meet some of the suggestions made by Dr. Voelcker. For example, drawing has been introduced and agricultural primers or readers have been prescribed. In some instances hand and eye training of the Kindergarten description and experimental gardens have been tried, but no substantial measure of success has been attained in either of these directions. Experimental farms, with schools attached, have been established in some Provinces, and in them greater success has been obtained. On the whole, the Government of India are of opinion that the question is one which cannot be forced, but should be dealt with gradually, and that greater success is to be expected from making instruction in the rudiments of agriculture part and parcel of the primary system of instruction in the country than from teaching it as a subject apart from the general educational programme. As a matter of fact, the Indian cultivator's methods, though empirical, are well adapted to his environment; and, as Dr. Voelcker says, we ought not to look so much to teaching improvement in any particular agricultural process as to the general enlightenment of the agricultural classes, and that expansion of their minds which will enable them to perceive for themselves the small reforms which are within their means and opportunities. It will be the object of the experimental farms, which Local Governments and Administrations may as opportunity presents itself establish, to make those experiments in improved agriculture which, when successful, will no doubt gradually filtrate downwards to the cultivating masses.

[*Education Proceedings Volume, December, 1894, Nos. 51-61: Papers relating to Technical Education in India (1886-1904), pp. 246-49 (Calcutta 1906).*]

SIR E. BUCK'S REPORT ON PRACTICAL AND TECHNICAL EDUCATION

General survey of position and progress of practical and technical education in various provinces—definition, evolution and significance of practical education—practical instruction in schools deemed as an essential preliminary to technical education—Imperial Resolution of 1897, Provincial Conferences and Irish Commission Report—study of drawing deemed essential as preparation for technical education and industrial callings and encouragement suggested—training for educational staff and proposed establishment of Imperial Department of Education—definition and promotion of technical education—defects of attempts at technical education and suggested remedies—different types of primary and technical schools existing in various provinces and analytic study of work done—Victoria Jubilee Technical Institute, Bombay, commended—suggestions for industrial schools—Naples Industrial School and proposed remodelling of Lucknow School on these lines—higher class of technical instruction—proposal for creation of National Institute of Technology—agricultural education—suggestions for improvement—art and artware schools—Moradabad School—Col. Jacob's collection of Indian art—general plan of action for industrial improvement.

THE mission with which I was charged in December 1900 was to enquire into the position and progress of practical and technical education in each Province (Assam and Burma excepted), and to submit a report on these subjects, with such suggestions as I might be able to offer, to the Government of India on the conclusion of my tour.

2. My tour commenced at the end of December 1900, and was concluded in April 1901. In every province the Local Government received me with much courtesy; took great interest in the subject of my mission; and provided me with every facility for prosecuting enquiry. To them my thanks are due, as well as to the officers, especially the Directors of the Educational Departments, whom they deputed to meet me, and to whose valuable advice and suggestions I owe much that is embodied in my report. I may here explain that I have not, in dealing with the subjects brought under discussion, attempted to enter into any detailed examination of the position of each province, but have confined myself to evolving from

the facts and opinions placed before me the general principles on which it would seem desirable that future action should be taken throughout India. In the following paragraphs I present the scheme of my report.

PRACTICAL EDUCATION.

3. In 1895-96 I was permitted to make a similar tour for the discussion with local authorities of a series of questions on which, before issuing final Resolutions, the Government of India desired to obtain the agreement and acquiescence of Provincial Governments. Among these questions was practical education in primary schools. By practical education is meant instruction by illustrations, object lessons, practical methods and exercises, as opposed to instruction confined to teaching by books, written exercises and learning by rote. It includes instruction in drawing and in science. It is the system which has for some years been adopted on the Continent, and is now being introduced into Great Britain as a necessary preliminary to all technical education.

Enquiry of 1895-96.
Practical education then
discussed.

4. The Provincial conferences of 1895-96 having unanimously agreed in certain broad educational principles, these were, in March 1897, formally enunciated by the Government of India in No. VI of the series of Resolutions dealing with the subjects of my tour.

Principles laid down
in Resolution of 1897.

5. In the meantime, after leaving India I devoted some time and attention to the subject of educational progress in European countries and Great Britain, and was proposing to make further personal enquiries on the Continent when I found that the subject had already been fully worked out by competent experts who had been deputed from Great Britain to examine the systems which had proved so successful in foreign countries not alone in improving education, but also in leading to rapid commercial progress. The most recent report on the subject is that of the Irish Commissioners, published as lately as 1898. It is so complete in scope, so full in detail, so clear and concise in conclusions, as to render reference to any other authority on questions relating to practical education in Europe almost unnecessary.

Irish Commissioners'
Report of 1898.

6. The discussion of the subject which was permitted in 1895-96 was so far fortunate that it has enabled me on my present tour to make a general examination of the progress which has in the

Progress since 1897.

last four years been effected in the required direction. The result of the recent enquiries is in some respects satisfactory. In Bengal a complete scheme, very similar to that now proposed for Ireland, has been founded on the discussions of 1896, and elsewhere much progress has been effected. In certain provinces, however, the Resolution of 1897 has not even yet, after four years, been brought under consideration. Important measures have, it is true, everywhere been taken in the direction of introducing more practical methods, but they cannot always be easily ascertained from the scattered rules and circulars of departmental manuals. Text-books in some cases demand revision; instruction in drawing needs to be made more practical; everywhere a clear and definite working plan, as provided in Bengal, seems to be required; while measures are admittedly called for to ensure the adequate instruction of educational recruits in the modern methods of educational science.

TECHNICAL EDUCATION

7. An industrial survey was made in each Province under the Industrial Survey of orders of the Home Department in 1888. 1888. Many of the reports then submitted provide useful information for the purposes of the present enquiry, especially as hitherto no definite action has been taken upon them.

8. One of the defects in existing industrial schools is the confusion of literary with technical instruction, and the too great prominence of the former. Division of literary from technical instruction and the too great prominence of the former. I have raised the question whether literary and general education should not be separately taken up by the Educational department and differentiated according to the needs of each class, leaving technical education to technological officers.

9. In many of the industrial schools now existing no working plans have been constructed; no sound principles laid down; no definite aims held in view; no practical results of value obtained. Existing industrial schools. Some schools conducted by exceptionally able missionaries have been successful, but, based as they are on eleemosynary principles, have not the same end in view as Government schools.

10. The opportunity which has now been given of discussing the system on which industrial schools should be worked has led to the framing of principles and plans which will, it is hoped, be accepted as sound and likely to lead to more positive and useful results. Suggestions for industrial schools.

11. I have not considered myself competent to bring under discussion higher technical education in Colleges and Universities, and must, in dealing with this subject, confine myself to a general consideration of broad principles, of which the most important is that of a proper preparation in the schools for the higher technical education which is to follow.

12. Only in the case of Agriculture have I premitted myself to enter into further details. Agriculture, as the most important industry in India, cannot be ignored. The principles on which technical instruction should be conveyed to cultivators are indicated by a promising scheme adopted in the Central Provinces; educational institutions for landowners are suggested; and the utility of Agricultural colleges are discussed.

ENCOURAGEMENT OF COUNTRY INDUSTRIES

13. A question to which it is understood that the Government of India attach particular importance is that of encouraging country industries, and although it is one which goes somewhat beyond the scope of my mission, I have ventured to include the subject in my inquiries. The question involves difficult problems, and will entail schemes which, when worked out, may demand considerable expenditure by the State as well as the co-operation and financial support of the native and commercial community. I can only pretend to offer suggestions as a basis for more complete enquiry for competent authorities.

My note deals with the subject under five heads:—

- (1) The improvement and encouragement of Indian art industries.
- (2) The improvement and encouragement of other existing industries.
- (3) The establishment of new industries to compete with imports.
- (4) The encouragement of exports.
- (5) Central departments of investigation and direction.

14. The improvement and promotion of art industries is the function of Art schools. These schools are doing useful work, but are not always free from the defects found in industrial schools. There is

in some cases the same absence of clear working plans, of well considered and definite aims, and of useful and practical results. Art schools indeed were a few years ago considered to have so conspicuously failed in their objects that the Secretary of State proposed their abolition, and although they have survived this danger, yet they stand in need of further reforms to make them secure against adverse criticism. It need hardly be said that, forming as they do the only agency by which the Government can assist in the preservation, restoration, and improvement of Indian art industries, their abolition would be a national misfortune.

15. In the case of existing country industries outside the sphere of Art, the general opinion of those most competent to judge is that there are *prima facie* grounds for believing that many of them can be effectively improved. In some instances little financial outlay would be required. In others considerable expenditure would be involved. A plan of action will be suggested in the chapter on the subject.

Improvement of existing industries.

16. The most important consideration in dealing both with the improvement of existing and the development of new industries is the field for which they should work. The most accessible market is that in India itself, which is now filled by imports from Europe (especially Germany), and which may, if anticipatory measures are not taken, be possibly occupied in a few years by a more formidable rival, China. This consideration will be the basis of the working plan which will be suggested for the promotion of country industries. It will be also part of the plan that technological officers should undertake complete and detailed survey of imported articles, and make a selection of those which can presumably be manufactured in this country.

Industries to compete with imports.

17. The first step must be enquiry. It is suggested that the technological officers should undertake, with the aid, which will be readily accorded, of native gentlemen or societies, a complete and detailed survey of imported articles and make a selection of those which can be presumably manufactured in this country. That they should then submit suggestions for action. Precedents exist which prove that with Government assistance (hitherto given as a rule only in the interests of military and official requirements), competition with Europe can be successfully undertaken.

Industrial survey and scheme for action.

18. The development of exports requires a more extended organization in view of the fact that it demands a study of foreign markets and requirements; the establishment of commercial agencies both in this country and abroad; and the aid of practical men for the development and execution of any successful schemes. What these schemes should be is a difficult question with which it is impossible to deal comprehensively in my report and in respect to which I can only venture to submit suggestions for the consideration of competent authorities and experts. I have, however, selected, for the purpose of illustrating the difficulties that have to be encountered, an industry in which the largest number of poor artisans are in this country concerned, *viz.*, weaving.

19. Finally, I shall venture to urge that the whole range of operations which are concerned with technical education, as applied to industries, and with the encouragement of country trades and manufactures, should be brought under the control and direction of a separate executive department both in each Province and also in the Government of India. When this has been done, a complete working plan would be drawn up, in which the duties and functions of the various provincial and commercial agencies would be clearly defined, and in which care would be taken that work is not needlessly reduplicated in different parts of India. The Provincial conferences have generally agreed in the suggestion to appoint temporarily special officers for purposes of preliminary enquiry. I shall further permit myself to suggest that no working plan should be attempted until the special officers who may be appointed have, after a few months of enquiry, been brought together for its discussion with the Imperial authorities. These questions will form the subject of the final chapter of the report.

20. In conclusion, I can only regret that the time at my disposal in each Province has been far too short to allow of anything like complete investigation, and that the main result of my tour has been merely to prove the urgent necessity for further enquiry by competent officers and experts. I venture, however, to hope that my report will provide such suggestions and information as will assist the Government in framing measures for the promotion of both practical and technical education as well as for the improvement and encouragement of town and country industries.

PART I

PRACTICAL EDUCATION

CHAPTER I

PRACTICAL EDUCATION.

21. Practical Education has been defined in the Preface as instruction by illustrations, object lessons, practical methods and exercises and in drawing and science, as opposed to purely literary instruction by books, written exercises and learning by rote. It includes what is known as the Kindergarten system, educational handwork and manual exercises. It is now accepted as "laying a solid foundation for any system of higher education—literary, scientific or technical—which may afterwards be found suitable to the talents and circumstances of students"—above all it is "an essential preliminary to technical education". The position is clearly expressed in the following extract from the Irish Report of 1898:—

Definition of Practical Education.

A strong desire exists throughout this country, and it is growing stronger every day, for the introduction of a general system of Technical Education. It is thought that a good system of Technical Education would contribute largely towards the development of arts and industries in Ireland; and in this opinion we entirely concur. But the present system of primary education is so one-sided in its character that it leaves the pupils quite unprepared for Technical Education. The clever boys trained in the National Schools, if they are disposed to seek for a higher education, may pass with advantage into Intermediate Schools of the kind now general in Ireland; but they are not fit to enter a Technical School, even if they had such a school at their doors. Now it seems to us that the changes we recommend would go far to remedy this defect. The system of National Education, modified as we propose, would give an all-round training to the faculties of the children, and would thus lay a solid foundation for any system of higher education—literary, scientific, or technical—which might afterwards be found suitable to their talents and their circumstances.

22. The evolution of the system has occupied more than a century—a fact which justifies confidence in the conclusions at which Continental experience has arrived. The history of the stages through which it has passed will be found in a memorandum¹ by Mr. Sadler, one of the leading authorities of the English Educational Department, in which he shows that it was introduced first as a

Evolution of Practical Education.

¹Memorandum by Irish Commissioners.

²Irish Commission's Report.

preparation only for industrial occupations; next, as a useful corrective to one-sided literary education in primary schools; and, finally, as a principle of education in all grades of schools. It is interesting to observe that among the reasons which led to its first introduction was "the fact that the development of machinery and the spread of the factory system had curtailed home industries, and had thus deprived large numbers of children of natural opportunities of learning how to use their hands in the various occupations once practised in the home." These considerations apply to India at the present time.

23. The development of practical educational methods led, however, to their occupying a much more serious position than that of merely preparing for minor industrial occupations. The conspicuous failure of many of the higher class technical institutions established in Europe and Great Britain brought about the discovery that their want of success was due to the absence of preliminary training of practical character in the schools. Thus in England the County Councils received liberal grants under the Technical Instruction Act for the promotion of technical education. They vied with each other in founding institutions and colleges; procured the best professors and teachers that the country could provide; introduced the most advanced systems of instruction; spared no pains to equip their buildings with costly laboratories and elaborate appliances; and then, in a brief period, reported, county after county, that their efforts had failed, because the students who arrived from the schools could not assimilate the instruction offered them.

Failure of technical institutions due to absence of practical education in schools.

"If there is one thing that has come out more clearly than the rest by the experience gained in the course of the work of the past five years, it is that a satisfactory system of technical instruction can only be established on the basis of a good previous general education..... Institutions which were founded to give a strictly technical education have had in many cases to prepare students by a general preliminary training to take proper advantage of special technical teaching." (*Liverpool Technical Instruction Committee for 1895*).

"In the reports recently submitted from various counties in England on the results achieved at technical institutions, a common cause of failure was found to be the absence of any training of the powers of observation in the schools of lower grades." (*Resolution No. VI of Agricultural Resolutions of 1897*).

24. The preceding remarks suffice to indicate the importance of recognizing practical instruction in schools as an essential preliminary to technical education, and it is from this point of view that it has become my duty to dwell at length upon the subject. But there is a wider consideration which deserves, and has, I believe, now received, the attention of the Government of India. It is this —experience has proved in Europe that what has been aptly termed by a leading German authority (Goetze) a “one-sided education,” *i.e.*, an education confined to literary instruction, leads to the creation of a discontented class. To quote the same authority, “a one-sided education produces men who think, not men who act.” The public speeches of His Excellency the Viceroy indicate that Lord Curzon has fully appreciated this view, and I will, therefore, leave the subject, which lies, perhaps, beyond the scope of my report, in drawing attention to the remarks of M. Martel, a leading French authority, which might be applied, word for word, to this country: —

“If, by too theoretical an education, such as our masters are now giving nearly everywhere, we induce these children (most of whom are already inclined that way by the mistaken pride of their parents) on leaving school to swell the already overflowing ranks of writers, office clerks, and competitors for minor posts in Government offices, we shall have spent the money of the communes and of the State upon a work not only useless but even dangerous; for with the millions thus improperly spent we shall have led away from productive occupations hundreds of youths who under better guidance would have been useful to themselves, to society, and to their country, and make of them in one word *déclassés*.”

CHAPTER II

IMPERIAL RESOLUTION OF 1897

25. The Imperial Department of Revenue and Agriculture was created in 1881. It was followed by the creation of provincial departments. Between 1881 and 1894 the Directors of provincial departments were frequently convened to discuss the various subjects with which they had to deal, among which was that of Agricultural Education. In 1888, at the instance of the Conference held in that year, the Home Department included in its quinquennial Resolution on educational progress a request that the Departments of Education and Agriculture might be required *to work out in concert* a scheme

for primary education "which would render the agricultural population capable of assimilating new ideas and of understanding any suggestion made to them." The subject was again discussed at Imperial conferences in 1890 and 1893. It was then ascertained that, although some reforms had been effected in primary education, the definite action suggested in 1888 had not been taken, and the Home Department was again in 1893 moved to issue further instructions, and in its quinquennial Resolution of 1894 impressed upon Local Governments the same policy. No concerted schemes were, however, worked out.

26. I have ventured to give this brief sketch of what occurred between 1881 and 1894, because the Agricultural conferences were the first in India to give prominent expression to the important principle that technical education must be preceded by practical education in the schools. Its recognition was due to the investigations, under the orders of Lord Connemara, of the causes of failure of the one Agricultural college then existing in India, at Madras, when Mr. Nicholson urged the necessity of training the intelligence of the rural population by practical methods before attempting to offer to them technical instruction in agriculture. (See *Report of Madras Committee on Agricultural Education*.)

The Agricultural conferences accepting this view were nevertheless careful to insist that the principles which they put forward for introduction in the scheme of primary education were not to have exceptional reference to agriculture, in view of the fact that they would be found equally valuable as a basis for *all* technical instruction.

27. The views of the conferences were again brought before the Local Governments in an excellent Resolution issued by the Revenue and Agricultural Department in 1895, in which it was asked that the subject might be made one of those to be discussed during my tour in the winter of 1895-96. I venture to draw special attention to the paragraph of the Resolution quoted below as a sound exposition of the arguments for laying the foundation of technical education in the primary schools. It was, moreover, a noteworthy coincidence that the Resolution was published shortly before the enunciation of similar principles by the English Educational Committee of 1895-96:—

"The principles which govern the introduction of agricultural instruction into the educational system apply also to all branches of technical instruction.

The question, therefore, is not merely how to adapt education to the training of agriculturists, but how so to fashion the plan of instruction as to promote in the pupils taught the power of assimilating easily any kind of technical instruction. The moulding of the educational scheme into a form which will lead to such a result is one on which ideas and methods have during recent years undergone a radical change in all of the more advanced countries of Europe. One great feature in the change has been *the substitution of the idea of development of faculty for that of mere acquisition of knowledge*. It is now acknowledged that the hand and the eye should be trained; that the powers of observation should be brought into play and improved by exercise, and that the actual teaching of a particular trade is of less importance, in the first instance, than educational methods which will adapt the pupil for the subsequent reception of technical instruction of any description. 'A system of education', writes the late Professor Huxley, 'which does nothing for the faculties of observation, which trains neither the eye nor the hand and is compatible with utter ignorance of the commonest natural truths, may naturally be regarded as strangely imperfect.' All technical instruction must indeed be founded on a preliminary training of a practical character in primary and secondary schools. In the reports recently submitted from various counties in England on the results achieved at technical institutions a common cause of failure was found to be the absence of any training of the powers of observation in the schools of lower grades. On similar grounds a charge was laid against the educational system formerly prevailing in the rural schools of England that it 'actually unfitted the children of farmers for an agricultural career.' 'Nevertheless,' wrote the author of the second Report published by the Royal Commission on technical instruction, 'there need be nothing in any scheme of rural education specially designed for the agricultural classes which should unfit the children for any other career for which individually they may be better suited.' The Government of India hold the same view. They admit indeed that agriculture, as the mainstay of the prosperity and wealth of the greater part of the population of India, deserves, more than any trade or profession, the special attention and care of those who are responsible for the instruction of the rural classes; but they are convinced that the early school instruction which is most calculated to produce eventually the best agriculturists will be equally useful to those who intend to follow any other occupation." (*Government of India Resolution No. 19-98, dated 20th September, 1895.*)

28. The provincial conferences which I attended in 1896-97 were unanimous in adopting the views advanced in the 1895 Resolution and in framing 'principles' by which effect was to be given to them.

29. The suggestions of the conferences received definite expression in a comprehensive Resolution issued by the Government of India in 1897, which summarized the defects discovered in many of the provincial schemes of primary education and laid down principles for future observance. The most important reforms which were advocated were:—

- (i) That object lessons should no longer be merely included in the education curricula as an *optional subject*, but should

be utilized as a *compulsory method* in the teaching of all subjects.

- (ii) That instruction should be given in connection with *familiar* objects.
- (iii) That elementary science should not be an optional subject, but compulsory through the medium of readers.
- (iv) That advanced instruction in any special science should not be carried too far.
- (v) That in view of the fact that the bulk of the population were interested in land, instruction should in all primary schools be given in drawing, rural and commercial accounts, and in such simple surveying and mensuration as can easily be taught to any boy.

It was pointed out in the Resolution that these instructions were in conformity with the principles advocated by the Education Commission in 1886.

CHAPTER III

IRISH COMMISSION'S REPORT

30. In 1896 the Commissioners of National Education in Ireland submitted a memorandum to His Excellency the Lord Lieutenant, in which they represented—

Memorandum of the
Commissioners of Na-
tional Education.

- “(1) that in the system of primary education which they administered, too great a preponderance was given to a purely literary education as distinguished from manual training and the habits of observation.
- (2) that the training of the faculties by more practical methods was desirable on the following grounds:—
 - 1. Manual instruction aids in the development of moral qualities, such as accuracy, industry, perseverance, etc.
 - 2. It has been recognized by medical authorities as having a beneficial effect on general mental development; it stimulates the intelligence of the pupils and increases their interest in other school subjects.

3. It develops the constructive faculty and fosters a sense of individuality in the pupil, as the work which he executes is so largely the result of his own labour.
4. It inspires respect for bodily labour, and corrects the notion that literary occupations are necessarily more dignified than those of the skilled artisan.
5. Such training in elementary schools forms a necessary preparation for the higher education given in technical schools, and its extension would thus greatly increase the industrial capabilities of Ireland.
6. The cultivation of habits of observation brings children into contact with things, as distinct from mere names, -and so makes their knowledge more real. This would be specially advantageous as regards agriculture, the instruction in which is, in the National Schools of Ireland, at present far too theoretical."

31. They asked therefore that Her Majesty's Government might be moved to appoint a Commissioner Appointment of the Commission. "to obtain information, and formulate a scheme for practical education." Information, they said, might be obtained by—

- "(a) getting information from experts;
- (b) sending competent persons to report as to the systems in existence elsewhere."

The Commission was accordingly appointed. The evidence of experts throughout Great Britain was taken; selected schools were visited; competent persons were deputed to examine and report on schools in Germany, France, Switzerland, Holland, and the United States; advantage was taken of evidence previously collected by the English Department of Education; and within two years, *ie* in 1898, the final conclusions of the Commissioners were published in a report of five volumes.

32. The plan of the report is excellent. It includes the results of an examination of the existing Irish school system; the reports of the agents deputed to foreign countries; the evidence of 186 witnesses; important papers written by competent experts at home and abroad on the subject of practical instruction; and a valuable memorandum by the "Director of special enquiries and reports to the English Council of Education." With this report on the table it is scarcely necessary to refer to any other authority or evidence on the subject of practical education in primary, or even in secondary, schools, in foreign countries. The most interesting

and valuable of the five volumes is the "Final Report of the Commissioners", in which they record in a concise statement (occupying three pages) the conclusions at which they have arrived with the grounds on which they are based, and then explain section by section and in fuller detail the objects and reasons of each of their recommendations.

33. The statement of the "Conclusions" of the Irish Commissioners forms Appendix I of this report. It is worthy of notice that their recommendations are positive, definite, and free from all hesitancy or doubt. Based as they are on such careful enquiry and full deliberation, they must carry great weight. Briefly, they consist in advising the gradual introduction of Kindergarten methods, educational hand work, and manual training, into all classes of primary and secondary schools; the compulsory teaching of drawing and of science; and in rural schools practical instruction in the more simple scientific principles that underlie the art and industry of agriculture; they lay great stress on taking the necessary measure of training teachers "with as little delay as possible"; and they conclude their summary of recommendations with a concise statement of the reasons on which they are founded. Their statement of reasons, quoted below, deserves to be read:—

"The considerations by which we have been led to the general conclusions above set out, will be fully discussed in the second part of this Report, under the several heads of Manual and Practical Instruction. But we think it will be for Your Excellency's convenience that the general summary of our conclusions should be here followed by a general summary of the grounds on which they are based."

"I. First, then, there are reasons founded on educational principles. The present system, which consists largely in the study of books, is one-sided in its character; and it leaves some of the most useful faculties of the mind absolutely untrained. We think it important that children should be taught not merely to take in knowledge from books, but to observe with intelligence the material world around them; that they should be trained in habits of correct reasoning on the facts observed; and that they should, even at school, acquire some skill in the use of hand and eye to execute the conceptions of the brain. Such a training we regard as valuable to all, but specially valuable to those whose lives are to be mainly devoted to industrial arts and occupations."

"II. Next we have the practical experience of those schools in England, Scotland, and on the Continent of Europe, in which such a system as we recommend has been already introduced and tested. The evidence we have received on this point is absolutely unanimous and, as we think, entirely conclusive. We have been told, over and over again, that the introduction of manual and practical training has contributed greatly to stimulate the intelligence of the pupils, to increase their interest in school work and to

make school life generally brighter and more pleasant. As a consequence, the school attendance is improved, the children remain at school to a more advanced age; and much time is gained for the purpose of education."

"We inquired particularly whether the literary side of school studies—reading, writing, arithmetic, grammar, and geography—had suffered any loss by the change; and the answer was uniform, that no such loss had been observed. In some cases, we were assured that the literary studies had been positively improved by the introduction of manual training. This result was accounted for, partly by the increased intelligence of the children, partly by the constant change and variety of their occupations,—many of the most useful exercises being only a kind of organized play—and partly by their increased interest in their work."

"We regard it also as a very significant testimony to the value of manual training that, wherever it has been once introduced, it has, with hardly an exception, been continued and extended. There has been practically no disposition to go back to the old system, which made primary education almost exclusively literary in its character; and after an experience extending over some years there is a general consensus of managers of schools, inspectors, and parents that the value of primary education has been greatly enhanced by the change."

"III. Lastly, there¹ is a consideration of a practical character, which seems to us deserving of no little weight. A strong desire exists throughout this country, and it is growing stronger every day, for the introduction of a general system of Technical Education. It is thought that a good system of Technical Education would contribute largely towards the development of arts and industries in Ireland; and in this opinion we entirely concur. But the present system of primary education is so one-sided in its character that it leaves the pupils quite unprepared for Technical Education. The clever boys trained in the National Schools, if they are disposed to seek for a higher education, may pass with advantage into Intermediate Schools of the kind now general in Ireland; but they are not fit to enter a Technical School, even if they had such a school at their doors. Now it seems to us that the changes we recommend would go far to remedy this defect. The system of National Education, modified¹ as we propose, would give an all-round training to the faculties of the children and would thus lay a solid foundation for any system of higher education—literary, scientific, or technical—which might afterwards be found suitable to their talents and their circumstances."

Thus they explain that a 'one-sided' literary education leaves some of the most important faculties of the mind untrained; that the introduction of practical methods has nowhere caused any loss, on the contrary has often been a gain, to the literary side of education; that the system has become popular with school-masters, pupils, and parents; that it is a necessary preparation for all technical instruction; and "lays a solid foundation for any system of higher education—literary, scientific, or technical—which may afterwards be found suitable to the talents and circumstances of the student."

34. It is important to observe that, although educational hand-
 Hand-work and manual work and manual training have been decided
 training a valuable basis by the Irish Commissioners from the evidence
 for higher technical ins- before them to be of so much value that
 truction. they have proposed their obligatory introduction into all primary and
 higher class schools of Ireland, yet that these educational methods,
 although very widely introduced into Continental schools, are not
 yet made compulsory in the curricula of all of them. It is only
 safe to say that, wherever they have been adopted, they have re-
 sulted in pronounced success, and are considered as a valuable basis
 for higher technical instruction.¹

CHAPTER IV

PROGRESS IN PRACTICAL EDUCATION SINCE 1897

35. The Resolution of 1897 was issued by the Department of
 Revenue and Agriculture with the concurrence
 Consideration of the of, but not by, the Home Department. This
 Resolution of 1897 by of, but not by, the Home Department. This
 Local Governments. circumstance may partly account for the
 fact that it has not in some provinces even yet, after four years, been
 brought under the formal consideration of the Local Governments,
 although the distractions of plague and famine are alleged as a
 further cause of delay. This delay in considering the Resolution
 does not, however, mean that no progress at all has been made,
 for there is a general tendency in all provinces to introduce prac-
 tical methods and subjects into their systems of school teaching,

¹The following is taken from Mr. Sadler's Memorandum on manual training:—

Norway.—Compulsory in all training colleges and town primary schools.

Sweden.—Given in 2,000 schools.

Denmark.—Not compulsory, but supported by State grant.

Belgium.—Adopted generally, but not compulsory.

Austria.—Progressing, but not compulsory.

Germany.—"The movement for manual training on strictly educational lines is becoming a strong one." Introduced into over 600 schools.

Switzerland.—Introduced into 19 out of 25 Cantons. Compulsory in some.

France.—Made obligatory by Act of Parliament in 1882 for primary, not secondary, schools.

America.—Development very rapid in recent years.

(*Appendices to Irish Report, page 18, et seq.*)

already in 1896 specially marked in Bombay, the Central Provinces, and the Punjab. Bengal was then more backward than any province in India; now it is the most forward. It is the only Province indeed in which, on the basis of our 1897 Resolution, a definite plan, in remarkable agreement with the Irish scheme, has been framed. The general position in each province is briefly sketched in Appendix II.

36. A great merit of the Bengal scheme is that it offers an intelligible and definite working plan, with a clear exposition of the principles upon which it is based. Under the orders of the Local Government, the plan is to be gradually worked out as time, money, and opportunity permit—the first necessary step being the training of teachers. I venture to submit that the same policy of a working plan should be followed in every province. I do not, in making this proposal, intend to indicate that the Bengal working plan is perfect or indeed suited to the circumstances of every other province, or that the Educational departments elsewhere are not working towards definite and right ends. But I do mean to allege that it is extremely difficult for anyone who wishes to form a judgment of a provincial scheme to “dig out” the aim and objects of it from the elaborate curricula or annual reports which are issued by the departments. I have only to refer to Mr. Cotton’s quinquennial review as an illustration of the absence of any clear and comprehensive sketch of the framework of the various educational schemes.

37. The curricula are fogged by the large number of optional subjects with which they are crowded, and by the want of any general information how far each optional subject is taken up, in the absence of which it is impossible to ascertain to what extent the aim of the department in introducing these subjects is fulfilled.

The annual reports again suffer, as a rule, from the defect which pervades all Indian reports (and which is reflected in Mr. Cotton’s review) in being occupied by comparisons between the statistics of one year and another, to the exclusion of intelligible history or programme, while any comprehensive view of national progress in any given direction is further obscured by the varying nomenclature, different standards, and multifarious types of school adopted in the several provinces.¹

¹The following (*paragraph 78, Cotton’s Report*) is an example of the confusion which now exists:—

“It is almost as difficult to classify Secondary schools as to define Secondary education. The fundamental division is again based upon the stages of instruc-

38. Under these conditions, it is somewhat difficult to gather together the facts which show what has been already done towards the development of practical education in each Province; and it is still more difficult to ascertain what is contemplated for the future. The proposition is everywhere, with reason, put forward that teachers must be trained in the new educational methods before they can be allowed to put them into practice. But this ought

The training of teachers.

tion recognised by the Department. The High stage is that which aims at the University Matriculation, or any co-ordinate examination. Any Secondary school having one or more classes teaching the High stage is deemed a High School, whether it also possesses a lower department or not. As the Matriculation examinations at all the Universities, with an insignificant exception for the Punjab, are conducted in English and demand English as a compulsory subject, all High schools are also English schools. All other Secondary schools are Middle schools; that is to say, they teach one or other of the several stages that are recognised by the Department as Middle stages. Here the differences between the several Provinces come in. Bombay, for example, recognises no Middle stage in which English is not the main feature of the curriculum, consequently, all Secondary schools are English, either High or Middle. But in all the other Provinces (excepting Coorg and Berar) a Middle stage is recognised in Vernacular instructions, as well as in English. Here, therefore, there are two classes of Middle schools,—English and Vernacular,—though the boundary line between Secondary Vernacular and Primary is not a strongly marked one. So far we have dealt with the classification adopted by the Government of India in its General Tables, which divide all Secondary schools into (1) High and (2) Middle, the later being subdivided into (a) English, (b) Vernacular. But in this chapter it will be more convenient to follow the classification of Mr. Nash, who treated all English schools together, subdividing them into High and Middle, and formed Vernacular schools into a class by themselves.

“It remains to mention some other systems of classification in use in the Provinces. In Madras, High Schools are called Upper Secondary; and Middle schools, whether English or Vernacular, are called Lower Secondary. In Bengal, High schools are either Collegiate or *zilla* (District) schools. Collegiate schools are those under the same management as an Arts College; *zilla* schools are arranged in three classes, according as they have (1) more than 300 pupils, (2) between 300 and 175, and (3) less than 175. Vernacular Secondary schools are sometimes known as Middle schools, and sometimes by the name of Lord Hardinge, the Governor General, under whose administration they were started. The title Middle schools is also used in Assam. The Director of the North-Western Provinces adheres to the old classification of (1) Anglo-Vernacular and (2) Vernacular schools. The former include both High Schools and Middle English; the latter, commonly known as *hakabandi*, mainly consist of Primary schools, with the addition of the few existing Vernacular Secondary schools. It will be observed that this classification is inconsistent with that adopted by the Government of India. In the Punjab, all English schools, whether High or Middle, are called Anglo-Vernacular; the term Vernacular is not applied to Primary schools, but it includes two High schools which teach up to the Matriculation standard on the Oriental side.”

not to interfere with the preparation of the scheme in which the teachers are to be gradually utilized. As stated in the 1895 Resolution, the French Government allowed seven years for the training of teachers before the reformed educational scheme was to be launched; but they had already elaborated the scheme and had furnished the training schools for teachers (*i.e.*, schools for teaching teachers), with a plan of the objects at which they were to aim. The policy of framing a definite scheme up to which to work has so far been adopted in Bengal alone (and even there only in connection with vernacular education), but is a policy which may usefully be commended to all provinces.

39. The conclusion drawn from my examination of the position throughout India is that the general intention of all the Educational departments is in sound accordance with the principles of the Imperial Resolutions and of the Irish and Bengal schemes; but that the measures taken or to be taken for the application of the principles are not always clearly defined, and are in some provinces insufficient. This conclusion is both satisfactory and unsatisfactory. It is satisfactory to know that the value of "practical methods" and of instruction including drawing and other educational handwork is appreciated, and that the policy of extending their application will not be opposed; but unsatisfactory to find that in some provinces no definite scheme has yet been drawn up on the basis of the Resolutions of 1895 and 1897; no final consideration has been given to those resolutions; no modification yet made in the curricula; that progress effected in the teaching of teachers is slow; and that some of the school books still offend more or less against leading principles.

The main and to some extent valid excuses are that funds are not available for more rapid progress; that education already absorbs a large portion of State expenditure; that famine and plague have reduced such grants as have been accorded for education; and have generally interfered with the consideration of educational subjects.

40. The question should now receive definite consideration how far the practical methods adopted in Ireland and in Bengal should be introduced into the educational working plans of other provinces. Framing of a clear working plan for each province. However long a period may be required to train teachers and to introduce reforms, there seems no reason why any time should be lost in framing the programme to which effect is eventually to be

given. A present Director may know what he designs, and his intentions may, as they seem to be in this case, be altogether sound, but neither his successor nor the Government can, without the existence of a clear working plan, form a sufficiently accurate idea of what are the future requirements, educational or financial, of the department, or indeed of the policy which is to guide future action.

CHAPTER V

READERS AND TEXT BOOKS

41. The Home Department, a year ago, issued a useful Resolution on the system of selecting text books. But
 Selection of text books. it is a question whether some further examination of the principles on which readers and text books should be framed is not necessary. The Resolution of 1897, in dealing with primary education, laid great stress on the desirability of teaching elementary science through the medium of readers, and in this connection drew attention to some prominent defects in the existing school books brought to light by the provincial conferences.

The defects pointed out in school books, dealing with elementary science, and agriculture, were that the language employed was often above the comprehension of young boys; that the terms used were too technical; that the vernacular translation of English scientific words was frequently imperfect; that the subject matter was not seldom badly selected; and that the text books sometimes aimed at carrying the pupil further than was necessary for any practical purposes.

It was suggested that, although the greatest freedom must be left to the provincial authorities in the choice of subjects and books suitable to local conditions, yet that some general uniformity of plan and system was desirable, and that the framework and general design of Educational books might usefully be brought under the review of a strong and capable Central Committee. The following are the words of the Resolution (Paragraph 26):—

The question indeed has been raised whether the scheme on which elementary readers and text books relating to agriculture and allied sciences are to be framed should not be worked out and revised from time to time by a competent committee of educational and other official experts who would, initially, deal only with the framework and general design of the educational books, leaving details to be filled in by provincial authorities so as to suit the

circumstances of each locality, and who would subsequently offer criticisms on any defects which might present themselves to their notice in the completed books. The subject is, however, one which demands fuller consideration.

42. The Prussian Elementary School Code lays down that the "foundation of all instruction is the reading of elementary school books, and it is therefore to the reading books of elementary schools that chief attention is required." "Nothing," it was said in the 1897 Resolution, "requires a higher exercise of the intelligence than to serve up knowledge in a form in which it can be easily assimilated and digested by the young, and so far as this is the case, the compilation of school books demands the employment of the best intellects in the country for the work."

43. The leading principle to be observed is that primary school books should be framed with reference to familiar objects and local surroundings. Thus in Germany it is required that the principle is laid down that in primary schools subjects should be connected with "Haimat-Kunde" (things that surround the home), and that in higher primary schools "concentration of subjects chosen round the special interests of the scholars should enable the scholar to perceive the direct relation of the knowledge to his daily life;" "the German wishes", it is written, "to prepare the lad who will afterwards proceed to technical studies by a liberal education based on lines not foreign to his normal experience and future occupation." In England the Second Royal Commission urged that "rural education should be based on what the child can see round him." In France the Ministry of Instruction, in his "directions to teachers", issued three or four years ago, requires that "in rural districts especially the teachers should give the *whole* of his instructions towards the daily wants and circumstances of the neighbourhood."

44. The principle above indicated is not equally observed in all provinces. Thus, while in one province the lessons are all intimately connected with familiar surroundings, in another there are lessons on such subjects as Chinese porcelain, Tattooing for beauty's sake, General Washington, Chinese mode of eating, Alchemy, etc. etc.

45. The same criticism applies to illustrations and models. The dog is too often "the Good dog Tray" of the English infant school. The chickens are in an English farmyard. The illustration sheets are full of foreign, not Indian, forms of animals; the models

in the normal schools are of English shapes, imported at considerable cost, and so on.

(I enquired at the Schools of Art and Engineering colleges whether the lithographic and modelling classes could not provide illustrations and models of more familiar forms at cheap rates, and was assured that they could.)

46. Another leading principle, strongly pressed in the 1897 Resolution, is that elementary science should be compulsorily taught through the readers and object lessons in a primary school. In Germany science and object lessons are *obligatory* in all schools.¹ In many of the Indian curricula they are *optional*, although there is an increasing tendency to teach some elementary science through the readers in primary schools. But here again the extent to which elementary science is taught varies greatly in different Provinces, while the character of lesson books, especially in connection with agricultural subjects, is of very different value.²

47. Further principles to be observed in the choice of reader subjects are noted below³ and many others will be found in Continental school literature, in the Irish Report, and elsewhere, but the above remarks suffice to indicate—

(a) that the acknowledged principles have received very unequal

¹See page 167, Irish Report.

²Thus Mr. Fuller's Manual in the Central Provinces has been proved by its adoption in Bengal and the North-Western Provinces to be of exceptional excellence, probably because it was worked out with care by an exceptional man both scientifically trained and acquainted with educational needs. *Per contra* in Bombay, Mr. Mollison, Manager of the Poona farm, was charged with the task of constructing an agricultural manual for primary schools. Now Mr. Mollison is an excellent agricultural expert, but has not been trained in educational science. He has during the last year or two compiled an elaborate work on agriculture, which will be of great use to students preparing for a University degree, but the primary manual will still be wanting.

³"On native objects those are to be made particularly prominent which arouse special interest (1) through the services which they render to men (*e.g.*, domestic animals, birds, silkworm, corn, spinning plants, fruit trees, salt, coal); (2) through the harm which they do to men (poisonous plants); (3) through the peculiarity of their life or way of living (*e.g.*, butterflies, trichinae, tapeworm, bee, ant). In larger schools such objects may not only be increased in number, but systematically arranged and more exhaustively treated as to their use in industry." (Section 34, *Prussian Elementary School Code*).

And again object lessons should be "arranged with special reference to the locality in which the school is situated." The same principle is to be applied to readers. (*special Reports on Educational subjects, 1896-97, Parliamentary Blue Book No. C.—8447.*)

attention in India, where those who draw up school books have often had no training in the science of education;

- (b) that the principles on which elementary readers should be framed required determination by competent central authority in order that the proper training of the intelligence for the reception of technical instruction may be equally ensured throughout India.

CHAPTER VI

- DRAWING

48. Instruction in drawing is, independently of its educational value in developing the faculties, most important as a preparation for technical education and industrial callings. This is well understood in all provinces. But progress is everywhere represented to be slow because of the difficulty of obtaining drawing masters and of training teachers. A great deal of this difficulty can be cleared away if the fact be appreciated that there is more than one branch of drawing, and that the one most important for educational purposes, especially in primary and rural schools, is geometrical drawing. The various branches of drawing are defined in the following paragraphs taken from the Irish Report:—

The various branches of drawing. "We find considerable confusion existing as to terms used to denote different branches of Drawing taught in elementary schools. We, therefore, define the meaning in which we propose to use certain terms.

"*Freehand Drawing*.—This term we apply to the reproduction on the same or different scales without mechanical aid, of examples which have been already drawn on the flat.

"*Mechanical Drawing*.—This term we apply to drawings produced by the aid of instruments, whether copies of drawings, plans to scale, conventional representation of solid forms, or the construction of geometrical figures, a form of drawing often included under the term 'Geometrical Drawing'.

"*Model Drawing*.—This term we apply to the pictorial representation of solid forms without mechanical aid.

"*Brushwork*.—A modification of freehand Drawing in which the brush and colour replace the pencil.

"*Colourwork*.—A system of drawing in which masses are represented by tints of colour.

"*Drawing in light and shade*.—The representation in monochrome of casts or objects with light and shadows properly depicted." (*Part II, Section III, Final Report of Irish Commissioners.*)

49. Professor Huxley, in urging the introduction of drawing into all schools, said, "By this I do not mean free-hand and artistic drawing, but the drawing of geometrical figures and plans." The principal of the Lahore School of Arts assured me that it would take the same number of months to train a teacher to instruct in this class of drawing, as it would take years to train efficiently a master in freehand and artistic drawing. The Irish Commissioners remark that—

"Mechanical (i.e. Geometrical) drawing is eminently utilitarian, and does not demand from teacher or pupil any skill in the unaided use of a pencil, that cannot be easily acquired. It may, however, be made the means of much useful training and mental discipline. The copying of rectilinear figures by means of the ruler and pencil, but without resorting to measurement, except as a check when the work is completed, is a useful exercise for young children in accurate observation and judgment of relative distances.

"Practice in the construction of geometrical figures is both a mental exercise requiring thought and reasoning, and a training that lays up a store of knowledge that will be frequently useful in after life, and if confined to the more elementary figures is quite within the scope of primary education."

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"A power to impart instruction in this branch, within the limits we have indicated, should not be beyond attainment by every teacher." (*Part II. Section III, Final Report of Irish Commissioners.*)

"In Germany primary schools drawing is taught almost entirely from the flat: in the highest classes the boys draw also from objects." (*Page 169, Appendix B, Irish Commissioners' Report.*)

In Switzerland "drawing starts with geometry." (*Page 201.*)

In France "the making of geometrical figures and their measurement is in geometrical drawing the chief work done in the average school." (*Page 218.*)

50. The present system throughout India is to teach freehand drawing of a somewhat high standard. Local Instruction in freehand drawing unnecessary. Governments may -perhaps be advised that except in the higher schools this seems to be unnecessary; and may be asked to consider the view which I have brought forward.

51. Many students now come to industrial schools only in order to get a free education in artistic drawing. "In the School of Arts at Madras," writes Proposed arrangements for rapid progress. Mr. Chatterton, "the majority are only learning a trade in order to get free instruction in drawing, and have no intention whatever of following the trade. The drawing instruction should be limited to the actual requirements of the artizan." The same tale was told at other Art schools, the main

object of the students being to obtain employment as drawing masters and draftsmen. The Educational Department should, in my opinion, prepare a forecast (a) of the number of teachers who will be required as special drawing masters in the higher schools (including training schools), and (b) of the number of schoolmasters required to instruct in geometrical drawing only, without the aid of a drawing master, in the lower schools, and should then make suitable arrangements which would secure in a legitimate way the rapid progress so much desired, and at the same time put an end to the roundabout method by which, at much waste of time and of State money, many teachers now get themselves trained.

52. In the Central Provinces the Local Government proposes to utilize patwaris and kanungos to train the village schoolmasters in simple geometrical drawing and map making, for, the main object in teaching drawing to country school boys (independently of the indirect object of training 'hand and eye') being to secure an intelligent knowledge of the village map, it is unnecessary that the rural schoolmaster should be required to have any further acquaintance with drawing than that possessed by the ordinary village officer¹. Whether this plan, which seems to have merits, can be adopted in other provinces or not, it is, at any rate, clear that the elaborate teaching which present systems contemplate can for the purposes of primary schools be replaced by much more economical and speedy methods.

CHAPTER VII

THE EDUCATIONAL STAFF

53. It is admitted by all the Directors whom I have met that education is a science in which educators must themselves be educated; that those who come out to India to direct the educational scheme have rarely received any professional instruction; and that

¹Colonel Barron, the best 'trainer of *patwaris*' in the Survey Department, recorded in his excellent manual of cadastral survey that he could teach any boy of 15 to survey a village in a month. It would, therefore, probably suffice if the *patwaris* and *kanungos* could give instruction for a fortnight each year in the slack season.

measures should certainly be taken to remedy this defect. This is especially important, now that the system of education is undergoing a complete change, not only in the direction of practical instruction and of preparation for the practical work of life, but also in methods of teaching.

54. The training of the provincial service and of schoolmasters is hardly less important. In each province there is an official who presides over the principal normal school for the training of teachers in subordinate normal schools, in which latter schoolmasters are taught. It is a question whether this principal official (the apex of the pyramid) has in all provinces had the requisite training at home in modern educational science and methods. As it is through him that the whole teaching staff is leavened, measures should be taken that both he and the officer who is to succeed him should be fully and thoroughly trained.

55. Everywhere the complaint is made that progress is checked by the difficulty of training schoolmasters with sufficient rapidity. Special measures should be taken, and, if necessary, special funds provided to ensure more rapid progress. Attention may here be drawn to the excellent scheme (described in Chapter V. of Part II) adopted in the Central Provinces for the practical training of village schoolmasters and which has already secured the efficient instruction of one-half of the whole number, a result nowhere approached in other provinces.

The Bombay Director writes that he would willingly adopt this plan if funds were forthcoming; and the scheme has received general approval elsewhere.

56. The questions brought forward in this chapter are only indirectly connected with the subject of my mission, but are so important to the cause of practical education that I venture to urge that they should be thoroughly discussed. I have myself only touched the fringe of them, and am not competent to do more. I suggest that they should be first brought before a conference of the Educational Directors, who could use the opportunity to discuss all other questions of general education alluded to in my report. I may add that there is a general feeling among the Directors in favour of a conference, at which they would be able to exchange views.

57. As I understand that the question of establishing an Imperial Department of Education is under consideration, I may perhaps be permitted to state that my recent enquiries have resulted in a conviction that some central organization would be desirable, which, without direct interference with such local action, as must be based on local conditions, would deal with broad principles and national questions affecting the education of the country.

In support of this view, I would refer to the action taken in the United States of America. The position there five and thirty years ago was very much like that in India now. Each State acted independently of every other State, with the result that various systems of education were evolved. In 1867 a National Bureau was established, which, without interfering directly with individual State action, has succeeded in the general establishment of sound principles and satisfactory co-ordination. The following are extracts from a note on the subject by one of the leading educational authorities in England¹:—

“Every student of education is under a debt of gratitude to the United States Government for the work of the National Bureau of Education of the United States. Its volumes, published under the direction of Commissioner W.T. Harris, have probably done more than any other single agency to encourage the comparative study of the science and art of education and of the various systems of educational administration now in force in the different countries of the world.”

“Education in America is left entirely in the hands of each individual State; the Federal Government exercises no control whatever, except in the scientific military training of the Army and Navy. Thus the functions of the Central Bureau of Education can in no sense be regarded as analogous to those which are exercised by the Education Department in England. It is therefore interesting to observe the purposes which the American Bureau of Education fulfils in a system which, from the Federal point of view, is so completely decentralised.”

“It follows as a natural consequence from the complete absence of central control over education in the United States that the systems of education adopted by the different States vary very considerably. Until 1867, no idea of co-ordination, or even comparison, appears to have been formulated.”

“To this end the Bureau of Education was established by the Act of March 2nd, 1867:—

“..... for the purpose of (1) collecting such statistics of facts as shall show the condition and progress of education in the several States and territories; and (2) diffusing such information respecting the organisation

¹Note on the National Bureau of Education in the United States by Mr. Morant, page 647, Special Educational Reports presented to Parliament, 1896-67.

and management of school systems and methods of teaching as shall aid the people of the United States in the establishment and maintenance of efficient school systems and otherwise promote the cause of education.' "

"The Bureau was, in fact, established from causes and for purposes very similar to those which gave rise to the Royal Commissions that have been appointed from time to time in England. It was to inquire into special educational questions and emergencies, to obtain opinions and suggestions from experts for dealing with the difficulties, to collect accounts of the methods by which other countries have dealt with the same, and to make authoritative recommendations as to the best means to be adopted for making effectual provision for future needs. And these functions were not considered to be a matter of temporary emergency; but the whole body of educational information was to be maintained up to date and available for the innumerable uses for which it is constantly required by the statesman as well as the educational reformer."

The above quotations indicate the value of a central bureau which, even under a Government that exerts less authority over its political divisions than any in Europe, has been nevertheless able to effect useful co-ordination and a thorough appreciation of sound principles.

CHAPTER VIII

RECOMMENDATIONS

58. The following suggestions and recommendations are based on the facts brought forward in the preceding chapters and on the conclusions to which recent enquiries and discussions have led:—

Recommendations.

- I. That the Government of India should exercise some general control over the educational systems and policy in India.
- II. That for this purpose there should be an Imperial Educational Department under a special officer who would be adviser to the Government of India.
- III. That consideration should be given to the question of the selection of educational officers hereafter joining the service and (if not professors) of their instruction in the vernacular and in educational science before they leave England.
- IV. That present educational officers (not being professors) should be given a special allowance while on furlough on condition

of their studying the science and practice of education in such way as may hereafter be determined.

- V. That the general aims and principles of education in India should be determined by the Imperial Government.
- VI. That as a first step towards this end, a conference of the Directors of Educational Departments should be convened before or after the winter inspection season.
- VII. That the Conference should be required to suggest—
 - (a) how, without interference with existing practice, the nomenclature of schools, standards and courses may be brought into greater uniformity;
 - (b) the measures desirable to secure the proper training of the imperial and provincial staff in modern educational science and methods;
 - (c) the measures and special grants required to secure the more rapid and effectual instruction of school masters;
 - (d) the principles to be applied for making the educational system more practical;

The 'principles' to be based on Imperial Resolutions of 1895 and 1897; on the Irish Final Report; on the Bengal scheme; and on the suggestions in this report.

- (e) the action to be taken for the application of the principles, i.e., the 'working plan';
 - (f) the expenditure and financial arrangements involved in the plan.
- VIII. That the Government of India should issue a Resolution based on the report of the conference to which a reply should be called for by a given date.
- IX. That the Resolution should include—
 - (a) a definite pronouncement on some issues, especially those in which broad principles are concerned, and suggestions on others, for the consideration of Local Governments;
 - (b) the offer where necessary of special (Imperial) grants for the year 1902-1903 in order to secure early action;
 - (c) a demand from each Province of a complete 'working plan' to be ready by (say) July 1902.

For consideration by Financial Department of expenditure involved before the next quinquennial budgets are arranged.

PART II

TECHNICAL EDUCATION

CHAPTER I

PREFATORY

1. Whatever may be the best definition of Technical Education, and there are many, there seems no doubt that in this country it has in 19 cases out of 20 come to mean the teaching of carpentry and smithy work to boys who have no intention either to become carpenters and blacksmiths or to engage in any manual occupation whatever. Why there is so much anxiety to increase the numbers of carpenters or blacksmiths, whether they are wanted or not in the locality, is not easy to discover—some give as a reason that because exercises in wood and metal are so much employed in Europe as an educational method therefore carpentry and smithy work are the most proper trades to teach; some that missionaries and schoolmasters find the trades easier to deal with than any others; and some again that the outturn is less difficult to sell than anything else.

However this may be, the opinion I have formed is that Technical Education should in India be held to mean the teaching of everything that is not, or ought not to be, taught in the ordinary schools. I say this with more seriousness than appears on the surface. For in the opinion of many good judges the failure of our technical schools and the imperfection of some of our higher technical institutions is due to an impossible attempt to accomplish a double object, *i.e.*, the manufacture of a scholar on the one hand and the creation of a craftsman or of a professional on the other. A fall, as always, “lies between two stools,” and both scholar and craftsman are manufactured badly.

2. In the Imperial Resolution dealing with the Report of the Education Commission in 1884, the Government of India drew the attention of Local Governments to the desirability of encouraging technical education. In October 1888 they further enjoined them to appoint special officers to conduct industrial surveys with the view of encouraging local trades and manufactures and of establishing industrial schools. The surveys were made; a great deal of interesting information was collected; a list was drawn up of industries deserving encouragement; the character of industrial schools

was discussed; and various suggestions were submitted for practical action.

3. On the reception of the reports no further move was made by the Imperial Government; it appears to have been inferred that suitable action would be taken in each province. In any case, it was hardly possible that, without the deputation of an imperial officer to discuss practical measures with the Local Governments, sound instructions could be issued on the conflicting views and recommendations submitted in connection with a subject on which Europe itself had not arrived at definite conclusions, and which in India required exceptional knowledge of local conditions.¹

4. The reports of 1888 naturally varied in merit and value. The most instructive on the question of industrial schools was that which came from the North-Western Provinces, whence a Committee (of which Mr. H. F. Evans was a member) was deputed to visit the various industrial institutions in other provinces. They concluded their report with six recommendations², to all but one

¹It is to the natives of India themselves that we must look for the knowledge which is so indispensable. The advance of technical education is indeed a task which more than any other requires initiative, suggestion, and support from the wealthier section of the Indian community. It is satisfactory to observe that their interest in the matter has been of late years awakened. Sir J. Jamsetjee and Mr. Tata, for instance, have given a brilliant lead, and there are many others who wish to follow. It is clear that where industries, trades, and commerce are concerned, the people themselves must be called upon to assist in the construction and the financing of any practical schemes. In the meanwhile, it may be the duty of the Governments to work out sound principles and to decide how far each of their Departments can usefully share in the work.

²"The recommendations contained in the foregoing paragraphs may now be conveniently brought together. They are:—

- "(1) The re-organisation of the Thomason Engineering College (paragraph 36).
- "(2) The institution by the Educational Department or by the University of a school final examination for the 'modern' classes of high schools (paragraph 37).
- "(3) The establishment of a School of Art at Lucknow (paragraph 38).
- "(4) The establishment of industrial schools at Rurki and at Lucknow or Allahabad (paragraphs 40-42).
- "(5) The establishment of an agricultural school at Cawnpur (paragraphs 44-45).
- "(6) The establishment of a teachers' training college at Allahabad (paragraph 46)". (*Paragraph 47, Report of the Committee on Technical Education, North-Western Provinces and Oudh.*)

of which¹ effect was given and which have in the province named provided a solid foundation for progress in practical and technical education.² But from all provinces a great deal of interesting information was received, especially from those in which suggestions were made for improving and encouraging local industries.

5. The main defect of the attempts at technical education throughout India is that there is no adequate differentiation of the instruction provided, whether in the ordinary schools of the Educational Department or in the so-called technical schools, for different classes of students. In considering this question it is impossible to separate the educational from the technical school, because, both being under the same department, the general education which is preparatory to technical instruction is given sometimes in the one and sometimes in the other. I intend however to show that general education ought to be confined entirely to the educational school and not allowed in the technical school at all. If this conclusion is accepted, general education must be more specialized and differentiated than it is at present.

6. It will be easily admitted that a different general education is required for workmen and for their masters. So, too, there are other classes whose special needs demand that the character of the 'general education' to be provided for them in the 'educational school' should be determined. 'General education' includes literary, scientific and 'disciplinary'³ instruction. Differentiation is therefore required in the quality and quantity of literary, scientific and disciplinary instruction which should be provided for each class of

¹The exception was the establishment of an Art School.

²This result affords a useful illustration of the value of the policy of bringing one province into communication with another whether by Imperial Conferences or by the deputation of officers to visit the various Provinces. Both systems were continuously employed since 1881 in the Revenue and Agricultural Department.

³'Disciplinary education' is described in the Irish Report under the head of educational handwork and manual training. "Disciplinary instruction," write the North-Western Provinces Committee. "consists in a series of graduated exercises in handicrafts and in the use of tools." It includes all that is understood by "hand-and-eye" training for purely educational purposes.

student in the 'general' as distinct from the 'technical' school. This question might seem to be one which the Educational Departments should determine. I venture to think that it is not. It appears to me that the Local Government itself should decide how much literary and disciplinary instruction is demanded for each class of the population; that it should determine what the character of that instruction should be; and should call upon the Educational Departments to provide it. The Educational Departments need have no connection with or control over technical instruction connected with industries and trade. In other words, literary, scientific and disciplinary instruction should be divided by a sharp line from Industrial and trade instruction. This view is shared by those authorities I have met who are, in my opinion, most competent to form a sound judgment.

The reasons are not far to seek. The educational officers, however able and accomplished they may be, have themselves had no practical training; are not brought by their profession into contact with industrial occupations; possess no technical knowledge; are naturally deficient in commercial aptitude; and may sometimes have a professional tendency to give to literary instruction too prominent a position in the industrial school. Nor have they themselves (oppressed by work as they already are) any desire to become entangled in industrial schemes which would interfere with their legitimate duties.

7. The great Educational Despatch of 1854 on which the educational scheme of the country is founded divided the classes for whom a different kind of instruction is needed under three heads—high, middle and low. This division, sufficing half a century ago for the purposes of initial organization, does not seem to adequately meet the present needs of India. The new century demands further differentiation. As a matter of fact, the Educational Departments have already taken some important steps in the direction of differentiated instruction. What seems now required is both further differentiation, and a determination of the line which is to separate the functions of the educational staff from those which appertain to the administration of industrial and technical schemes.

8. I am not competent to submit conclusive suggestions for sound differentiation, but venture to submit as a basis for consideration the following schedule of the classes for whose needs varied courses of instruction in

“educational schools” seems to be required:—

- (a) Workmen in large establishments.
- (b) Industrial artizans.
- (c) Artizans of higher class in large establishments.
- (d) Cultivators.
- (e) Landowners.
- (f) Government officials.
- (g) Those destined for higher technical professions.
- (h) For commercial professions.
- (i) For literary professions.

(a) For working men or artizans of the lower class in such establishments as railway workshops, foundries, etc., no literary instruction is demanded—only in Madras, where the education of the masses has reached a higher level than elsewhere, at Lahore, and at Cawnpur, did I find a contrary view pressed. The subject will be dealt with under industrial schools.

(b) Industrial artizans, *i.e.*, artizans themselves carrying on special industries, require little or no literary education. School instruction may be limited to the three R's, mechanical drawing and educational handwork. Only in the case of art industries need instruction in drawing and modelling be specialized.

(c) For artizans of higher class in workshops and foundries little literary education is demanded—drawing is the chief subject in which instruction is asked for. In most cases adult classes in evening schools will meet requirements. For boys educational handwork and manual training should be made compulsory.

(d) For the cultivating classes, the lowest form of literary education is required compatible with such training of their faculties as will enable them to grasp the meaning of agricultural improvements offered to them, and to protect themselves against their natural enemies, the landlord, the money-lender and the Government official¹. This subject will be dealt with in another chapter.

¹This view is generally accepted in all provinces, but the most prominent expression has been given to it in the Proceedings of a Special Committee in the Central Provinces appointed two years ago to deal with the course of instruction for rural schools.

(e) *Landowners*.—A special course of instruction should be opened for those who intend to spend their life in the administration of their estates and who can with their own concurrence be differentiated from other students.

(f) *Government officials*.—For many classes of Government officials a specialized education is desirable. This view has been recognized in Madras, and has been acted upon in the Central Provinces and North-Western Provinces.

(g) For those destined for higher technical professions some provision has been made in almost all provinces by a bifurcation in the high schools, which provide A, a literary course; B, a science course, each leading to a different university degree. Further suggestions on this subject are submitted in a later chapter.

(h) For those who intend to join a commercial calling commercial schools or a commercial course in selected schools are in some provinces provided in important towns. It might be desirable that the plan should be followed elsewhere. The question is one which deserves further consideration by all Educational Departments and Local Governments.

(i) For those designed for literary professions including those of course who desire a literary education. This is a subject into which I need not enter except to remark that the literary course is one from which all others are differentiated.

9. In dealing with the above suggestions it should be understood that the specialized instruction may be given altogether in the ordinary school, or partly in the ordinary and partly in a special school, or altogether in a special school. Thus industrial artizans need far more instruction in drawing and manual exercises than ordinary students, and must be put either in a separate school or in a separate class of the ordinary school. Among the classes who would require special schools at some period of their educational career are landlords and Government officials, for which latter class indeed separate schools are already provided in some provinces.

The main point however to which I desire to draw attention is that all the instruction to which the preceding suggestions refer comes properly under the administration of the educational departments, whose functions should end there and not be extended to the technical school.

TECHNICAL EDUCATION

CHAPTER II

EXISTING INDUSTRIAL SCHOOLS

10. This chapter may be opened with a schedule of the different types of primary and technical schools I have found to exist in the various Provinces.

Class of School	Provinces in which found
PRIMARY	
I. In which no teaching is given by practical methods, <i>i.e.</i> , Kindergarten, object lessons, illustrations etc.	I. North-Western Provinces.
II. In which object lessons and elementary science are optional subjects.	II. Madras.
III. In which practical methods are employed.	III. More or less in every province More perhaps in Bombay and the Central Provinces than elsewhere.
IV. In which hand-and-eye and manual training are added to III.	IV. Central Provinces town school; North-Western Provinces English schools ; Bengal vernacular schools.
TECHNICAL	
V. Manual work schools on the "disciplinary" system, which prepare boys by manual exercises for manual occupations.	V. All industrial schools in Bombay.
VI. Schools which give literary instruction combined with teaching a trade under school officials.	VI. Aided schools, chiefly mission, in Bombay, Madras, North-Western Provinces and Central Provinces.
VII. Special trade schools not giving literary instruction for teaching improvements in an industry or for teaching a new industry under school officials.	VII. Sericulture school in Bengal ; Aluminium school in Madras ; Art schools in Bengal, Madras, Bombay, and Punjab ; Rurki College Industrial Class.
VIII. Special schools for training artizans in foundries, workshops, etc.	VIII. Lahore.
IX. Special schools for higher class employés	IX. Victoria Jubilee Institute, Bombay.
X. Special trade schools for teaching industries under native artizan teachers on the Naples system.	X. To be introduced at Lucknow : recommended for all towns.

[Primary schools have been dealt with in Part I, but are retained on the schedule because in appended notes and correspondence, types are referred to by their schedule numbers, which cannot therefore be now altered.]

11. *Schools of type V* exist only in the Bombay Presidency, where there are 12 of them. The essential feature of the education given in these schools is that no attempt is made to manufacture on commercial principles. Instruction is of the educational character described by the Irish Commissioners in connection with educational handwork and manual work in scholastic institutions. But the object in the two cases is different. In the Bombay industrial school the design is to train the sons of artizans for manual occupations. In the Irish Educational school the object is to improve the intelligence and faculties of all boys.

The scheme is to require the boys to bring from the literary schools a certificate of having passed a given standard; and then to give during a three years' course instruction (a) in drawing, which reaches a fairly high artistic level; (b) in a graduated series of "manual exercises" in carpentry and iron work which towards the end are of a somewhat elaborate character; and (c) in the practical use of tools in a workshop.¹

12. This system of training would have merit if it led up to any definite object. *Prima facie* it would appear that the main object is to turn out first class carpenters and blacksmiths. But that, at any rate, is not the actual result, as, with negligible exceptions, none of the boys take to manual occupations. They are able indeed to find better employment as draftsmen, workshop overseers and so on. The objection advanced in other provinces to this type of schools is that, while both literary and drawing instructions seem too advanced for working artizans, the general education is really too low for higher employments. From a broad point of view, the three years' training given in intense form in the industrial school may be regarded as just the sort of training that ought, as in the Irish scheme, to be spread in lighter form over the whole of the educational course in the ordinary schools. As it is, the three years' special instruction is an interruption to the general educational course, in view of the fact that boys turned out at the age of 13 or 14 must or ought to continue their general education

¹The literary standard required is the 5th primary, which is too high for the artizan and too low for superior positions. In a school I visited sign-painting and printing were taught, and so far it may be said that no teaching of trades was given. The uses of tools was taught in the neighbouring Municipal workshops for an hour or two a day. There was only one artizan's son in the school, and enquiry indicated that none of the boys took to manual occupations.

until old enough for employment unless they at once adopt, which they do not, a manual trade as apprentices¹.

13. The *school of class VI* is the favourite type of industrial school in India. This type may be said to have been founded by the missionaries, but has been more or less copied in most of the industrial schools established by official authority. In schools of this class a good deal of literary education is given at the same time that minor trades, of which the most prominent are carpentry and smithy work, are taught. Almost universally "things" are made for the market, their sale providing as far as possible for the maintenance of the school; whether the boys on leaving the school follow the trades which they are taught depends a good deal on the management of the institution. As a rule, they do not.

The method of instruction is faulty, the boys being taught by a salaried artizan who has no personal interest in the success of the work turned out, while the literary education is too advanced for those who are meant to follow a manual occupation. The largest number of schools of type VI is naturally found in Madras, where there are many more missionaries than in any other Province. Mr. Chatterton, the officer lately appointed to deal with industrial education in that Presidency, condemns the type as having a double object in view, and failing in both.²

¹The officer, second in command at the Poona Engineering College, who established and still supervises this system, has the merit of being a strong advocate for the introduction of manual training into ordinary schools, and, were this done, it is doubtful whether the boys trained in the industrial schools would find it so easy as they do now to compete with better educated rivals for higher employments.

²"Schools under class VI have a double object in view, and as a rule they fail to achieve success in either branch of the work. *I therefore think that the establishment of such schools should not be encouraged.* This, I think, also is the opinion of the European managers of many of the Mission Schools, though some advocate, for their own requirements, the establishment of schools of the type described in class V, in which the boys get a preliminary knowledge of handicraft, and then when they have attained a certain degree of manual skill and completed their course of general education, they are drafted into a special trade school (class VII). This, I think, has been the idea from the very outset, and schools of class VI have arisen through the inability on the part of the managers to clearly recognise the necessity for keeping schools of class V and class VII perfectly distinct." (Note by Mr. Chatterton.)

14. There appear to be many reasons why the Government should not adopt the No. VI type introduced by the missionaries. Among them are these:—

- Reasons why Government should not adopt type VI.
- (a) The boys for whom such education is provided by missionaries are as a rule either orphans or Christians, with no family connections who could train them in any industrial calling.¹ The Government, on the other hand, desires to give a training to the children of artizans.
 - (b) The undertaking of commercial transactions by Government officials is from many points of view objectionable. They are bad traders to begin with. The management of trade schools by district boards and municipal councils is, writes Mr. Chatterton, always unsatisfactory, while native subordinates cannot be trusted in financial transactions. Moreover, there are serious objections to purely Government institutions competing with local artizans.²
 - (c) Boys trained in schools of type VI, unless these are under the management of exceptionally able missionaries, seldom adopt the trade taught. While the object of Government is that the boys of an industrial school should follow the trade taught.

For the above reasons it may be safely concluded that schools of type VI should be condemned.

¹Indian industries are at present in the hands of certain castes; hence it is difficult for those outside these castes to learn a trade except through the agency of industrial schools of some kind. In the Madras Presidency a number of schools exist which may be classified under class VI. These are practically all Mission Schools, and are intended for the benefit of the Native Christian community.

²The following remarks are made in the report of Mr. Evans' North-Western Provinces Committee on a school of type II under Muhammadan guidance:—

"The first is more of the nature of a charitable institution than a school in the strict sense. In Madras, for instance, a body of benevolent Muhammadan gentlemen have formed an association (the Anjuman-Islamia) for improving the condition of the indigent Muhammadans inhabiting one of the quarters of the city. The pupils are taught to read, write and draw, and also spend a considerable portion of each day in workshops attached to the school. There they learn carpentry, carpet weaving, embroidery and cabinet-making. The goods turned out are exposed for sale in a shop opened for this purpose in one of the principal streets, and orders are executed for the outside public. The Society receives from the Education Département considerable grants for teachers' salaries and the contingent expenditure; and also capitation grants for

15. *Schools of type VII.—Special Trade Schools giving no literary instruction.*—The Honourable Sir Edward Law, in discussing with me the question of technical education, remarked that what appeared to be required in India was a special trade school for each particular industry in the locality where the trade is or might be carried on. The principle involved in the remark is sound. But, outside the Art Schools and Rurki College, only two such schools were to be found in the country—the Sericulture School in Bengal and the Aluminium School in Madras. I myself led to the institution of the Sericulture School by procuring the deputation of a native gentleman (qualified by a scientific training¹) to Paris, to be instructed in the Pasteur methods of dealing with silkworm disease. The school has, as far as it goes², been a success, and has led to the adoption of scientific methods of silkworm rearing³. This school, however, deals with adults, not with boys.

I have somewhat strained the meaning of school in applying the designation to Mr. Chatterton's Aluminium Workshops in Madras. But in one sense they form a special trade school in which boys and workmen are taught a new trade with facilities for carrying into practice outside the workshops what they have learned inside. The success of the scheme is known.

16. Turning now to Art Schools, which deal with special professions and trades, it will be found that they teach primarily drawing for the production of drawing masters and draftsmen. This

pupils who pass the prescribed standards of general education and industrial proficiency. Cheap breakfasts and dinners are provided for the boys, and they also receive small sums in the form of daily wages. The object of the institution is to bring up the pupils as practical workmen in a particular trade, and considerable success has, we are informed, been attained in this direction. There are serious difficulties, however, attending a commercial enterprise of this kind. Goods are not always readily sold, and stock accumulates. Undesirable competition with private traders is set up, and as the work of beginners is often defective, paid workmen have to be entertained in excess of the number required as instructors. We do not, therefore, recommend that schools on these lines should be established by the State. But as a form of private charity, they may often do much good, and grants-in-aid might with propriety be given to the managers. (*Paragraph 11. Report of the Committee on Technical Education, North-Western Provinces and Oudh.*)

¹Mr. Mukharji, a Cirencester Gold Medallist.

²In Japan separate instruction is given in silkworm rearing and in silk spinning and weaving.

³It is now common to see silkworm rearers examining with microscopes "seed" offered for sale in the bazaar.

is sound and successful. Secondly, certain trades which are followed in the town, such as photography, lithography, printing,¹ architecture, designing, painting and sculpture, wood engraving, etc., and so far all is sound.

But they also take up the teaching of trades which are not practised in the neighbourhood, such as carpet-making, pottery, art industries of all kinds with the laudable object of maintaining, restoring and even improving oriental art. Unfortunately, the breach of the rule that trades should be taught in the locality of the trade brings with it failure. For the students do not follow, and never have intended to follow, the trade which they have taken the trouble to learn², partly because they have no capital or facilities for carrying it on in the neighbourhood and partly because they have not been selected from the right class. Thus the main object of the Art School, which is to preserve, restore, and even improve by its influence oriental art industries, is defeated.

In other ways this system of teaching trades has been found objectionable. The system requires that "things" should be made. Thus carpets, vases, and figured ware are manufactured and must be sold, until the school becomes, what it was never intended to be, a commercial institution. Then arise the usual difficulties. The masters are not, and do not pretend to be, acquainted with commercial business, and both financial and educational³ embarrassments ensue.

The principles on which art trades should be taught will be discussed in a later chapter.

17. *Schools of type VIII.—Special schools for training artisans for employment in foundries, workshops, factories, etc.*—

Schools of type VIII. *—The only Government school of the kind I have found in India is at Lahore.*

¹It may be a question whether printing and lithography need be taught in an Art School. The preparation of candidates for the University Examinations in Engineering is also undertaken at one School of Art, and as this involves surveying, building, mathematics, etc., it is doubtful whether it is a legitimate branch of instruction for an Art School.

²As the Principal of one School of Art told me, if they don't get drawing-masterships, they become ticket examiners on an omnibus rather than attempt to follow the trade they have learned.

³The following is the story told by the Principal of one School of Art: "The school authorities had undertaken to provide the Municipality with a large number of iron railings with fancy heads. One fancy head was perhaps a good lesson. But to make scores of iron rails and scores of fancy heads all on the same pattern was no education at all, and the student's time was wasted."

The Lahore school has done useful work, but seems subject to the defect existing in schools of type VI in giving an education too high for artizans and too low for other employments. The majority of the boys have no intention of taking up any manual occupation, though some artizan's sons are said to leave for the workshops at an early stage of the course, while others who stay to a later stage are employed as carriage inspectors, etc. But there is no definite differentiation. The type is open to Mr. Chatterton's objection of the "double object", and is not, unless modified, one to be imitated.

The following note on the school occurs in the report of Mr. Evans' Committee—

[“The object of the school is to provide a suitable education for children of the artizan class, especially for children of artizans employed in the railway workshops. By ‘suitable education’ is meant an education in which instruction in reading, writing and arithmetic, elementary mechanics, physics and drawing is given in strict subordination to manual training in the workshop under skilled instructors. The Lahore experiment proves that this can be accomplished at a comparatively little cost, that such a school is popular with the class for which it is established; and that it is training up a superior class of workmen.” (*Paragraph 40, Report of the Committee on Technical Education, North-Western Provinces and Oudh.*)]

Persistent enquiries made in all the large railway workshops and private foundries and factories that time permitted me to visit proved the existence of an almost universal opinion that artizans' sons required no literary training. The prevailing view was that any kind of literary training would make the boys dissatisfied with an artizan's career; that they would, as the Superintendent of one Government workshop told me, “get their heads in the air”; that the instruction given to them by their fathers was better than any that could be given to them outside; and that it sufficed for all practical purposes.

An exception has been found at Cawnpur, where, partly in consequence of my visit, Mr. MacRobert, President of the Chamber of Commerce, proposes to establish a school in the centre of the workmen's villages to serve the purpose of all the numerous factories in that place. The teaching will include a low literary education with a large proportion of educational handwork and manual training. The school will be in fact very much on the model of the Bombay type of industrial school which I commended as excellent if it were to be followed up by positive employment. This condition will be fulfilled at Cawnpur. Indeed, after the age of 10 the boys will be admitted to the factories as half timers, and attend at

the school for half the day until the age of 14, when they can, under the Factory Act, work full time.

The prominence given to educational handwork and manual training will perhaps remove the objections which workshop and factory managers now have to any kind of school instruction; the Cawnpur school will probably prove that the educated boys will be much more intelligent workers than the present illiterate youths, however deft the latter may be with their hands and fingers. The progress of the school should be watched, and if it prove[s] successful, as I am confident that it will, may be imitated elsewhere.

18. *Schools of type IX.—Training for higher class employes.—*

Schools of type IX. The superintendents of workshops and foundries generally admitted that those of their establishment who were employed in making "things" from drawings and plans would be the better for some special training, though it is wonderful how men of this class, who cannot even read and write, much less draw, succeed in making to scale from a plan even the most elaborate "patterns" carved in wood for purposes of mould casting. One or two managers told me that they did not want even these men taught, but the European overseers who had to look after them whispered that they had to devote a great deal of time to the close superintendence of their operations. There is therefore an admitted want of special instruction for "pattern-makers" and all other workmen who have to make "things" from "drawings." How to satisfy the want will be dealt with in another chapter.

19. Turning now to other higher class technical training, the

Other higher class
technical training.

only important technological institution unconnected with Government Engineering and Medical Colleges which I found throughout India was the Victoria Jubilee Technical Institute at Bombay, where specialized instruction is given to older students (most of whom have matriculated at the University) in mechanical engineering, cotton manufacture, sheet metal working and enamelling. The majority of the students find useful and well-paid employment, especially in the cotton mills of Bombay. The "City and Guilds of the London Institute" have allowed this institution to be affiliated to them, and students are annually examined on their behalf at Bombay. Evening classes attached to the institution are attended chiefly by Eurasians and Europeans¹.

¹For a further account of the Victoria Institute, see page 268, Cotton's Report.

The institute was unfortunately closed while I was at Bombay on account of plague, but it deserves careful inspection by experts with the view of ascertaining whether institutions giving specialized instruction of the kind should not be encouraged elsewhere.

Another technological institution has been established in Baroda which I could not visit, but which I heard variously criticized. This again should, in my opinion, be visited and reported upon by competent experts.

At Ahmedabad a wealthy native gentleman is founding an Institute something on the Victoria Institute model, but to be confined in training students for higher employment in cotton mills only.

In Bengal a scheme has been drawn up for attaching schools for the training of subordinate engineers to selected high schools (one has been already established at Chota Nagpur), which are to be affiliated to the Engineering College at Sibpur (Calcutta). In view of the fact that there is a growing demand for subordinate and mechanical engineers, the plan is a good one, and might be adopted elsewhere.

20. *Schools of type X.—Industrial Schools on the Naples system.*—When at Naples, I inspected with Mr. Radice, of the Bengal Civil Service, who resides there, a school which has met with exceptional success based on principles which, *mutatis mutandis*, may be usefully applied to industrial schools in India. Its main characteristics are the separation of educational from technical training and the apprenticeship of boys in workshops conducted not by the Government official but on their own account by master-artizans of the trade taught. The principles involved will be fully discussed in the following chapter.

CHAPTER III

SUGGESTIONS FOR INDUSTRIAL SCHOOLS

21. The chief defects in most of the existing industrial schools are, as we have seen, that general and technical education are combined; that instruction is not differentiated for different classes; that disproportionate attention is given to carpentry and smithy work;

Defects in existing industrial schools.

that aims and objects are not defined, or, if they be, are not kept in view; that if a trade is taught, it is not followed; that attempts at working for a market lead to embarrassment, and that, the leading defect of all, no clear principles are laid down.

22. I shall deal with the last question first, and in doing so I must acknowledge the assistance I have received from Colonel Clibborn¹, Mr. Chatterton², and Mr. Burn³ in developing the principles on which industrial schools should be worked. Colonel Clibborn indeed placed on record some of the most important of them two years ago⁴.

The principles worked out are these:—

- (a) Literary and general education to be entirely separate from technical instruction.
- (b) The former to be differentiated to meet the needs of each case.
- (c) Only those trades to be taught which are, or can be usefully, practised in the locality.
- (d) Only those in which there is *prima facie* prospect of improvement.

¹Principal, Thomason Civil Engineering College, Rurki, North-Western Provinces.

²Principal, School of Arts, Madras.

³Principal, School of Arts, Bombay.

⁴“For the trainings selected to be popular and successful, it appears to me necessary that the following conditions should be fulfilled:—

- “I. They should not trench on the ordinary functions of large workshops, mills, and manufactories.
- “II. They should not demand the use of expensive Installations or Machinery.
- “III. They should not require the Government to provide employment for the outturn.
- “IV. They should not require a high standard of literary education.
- “V. The trades selected should turn out work in, or likely to be in, good demand by the public.
- “VI. As far as possible, trades should be selected which are indigenous to India, but still capable of improvement by expert instruction or the introduction of scientific methods. If exotic trades are selected, the produce should be agreeable to native taste or greatly in demand by Europeans in India.” (Note by Lieutenant-Colonel J. Clibborn, I.S.C., on the trades suitable for Provincial Industrial Schools).

- (e) Only those for which there is reasonable prospect of demand.
- (f) Only boys likely to follow the trade to be taught.
- (g) Payment the rule, exemption the exception.
- (h) No expensive installations or machinery to be used.
- (i) Finished work to be turned out for the market.
- (j) Government to have no responsibility for the outturn.

23. The following are the "objects and reasons" which justify each "principle":—
 Objects and reasons which justify the principles.

(a) *Separation of literary from technical instruction*.—This has already been discussed. It may be effected—

- I. By using a neighbouring school for literary instruction¹.
- II. By having a separate literary school on the premises².
- III. By using separate rooms under the same roof³.

The point is that in all cases (A) an educational officer presides over the literary education, (B) a technological officer over the trade education. It is generally agreed that, where an educational officer conducts both literary and technical instruction, there is a leaning on the part of both master and boys towards the literary side—the very tendency to be corrected.

*Manual exercises*⁴ which must form an important part of the general education may be conducted either by (A) or (B).

(b) *Differentiation of literary and general education*.—This subject has already been dealt with. For some industries no literary education is wanted. For some a little literary instruction with a great deal of drawing, specially mechanical drawing; for others manual exercises; for others, again, arithmetic and accounts; and so on. In other cases half time in the school, half time in the shop.

The Lieutenant-Governor of the North-Western Provinces (Sir Antony MacDonnell) has decided that no literary qualification at all should be required for entrance to the Lucknow Industrial School. The object is to attract the sons of artisans who, like the

¹As at the Cawnpur Industrial School.

²As proposed at Lucknow.

³As at Naples.

⁴Exercises in card cutting, wood carving, etc.

workshops manager quoted, dread the "getting the head in air"; fear the boys won't return to the trade; and object to the loss of time incurred. For the present the decision is no doubt wise, though later on, when confidence is established, it may be desirable, as recommended in Madras and at Cawnpur, to give all boys some literary instruction for the improvement of their general intelligence; to enable them to keep accounts.

In the meanwhile, the authorities responsible for the general conduct of the school should call upon the Educational Department to give just so much or so little general instruction as they decide to be necessary in each case. Often it will be "so little¹."

(c) *Only those trades to be taught which are or can be practised in the locality.*—As I have elsewhere noted, many of the "technophils" (people who cry aloud for technical education without knowing what they mean) are made happy by attempts to manufacture carpenters and blacksmiths by the score, whether they are wanted or not; generally they are not wanted, and are badly manufactured².

Not that localities do not exist which both want and ought to be provided with carpenters and blacksmiths if they can be decently manufactured. Such are the Central Provinces, hitherto cut off

¹"In industrial schools the success is greatest in which the least attention is paid to the literary instruction. It is the general opinion of the employers of artizan labour that it is easy to give artizans too much literary education, the only result of which is to cause them to direct their thoughts towards clerical employment. I am of opinion that every artizan should be able to read and write in his own vernacular and to know sufficient arithmetic to be able to solve all the simple problems connected with his wages which are of daily occurrence and of great importance to him. Beyond this the only instruction which I think it is desirable that an artizan should receive is in drawing. With the great bulk of artizans the amount of drawing which it is necessary to teach them is limited. It is usually assumed that because drawing is a good thing for artizans, therefore they should have as much of it as possible, and in general there is a tendency for drawing instruction in industrial schools to be considered actually of greater importance than the trades themselves." (*Note by Mr. Chatterton.*)

²"The prevalent idea of a technical school", writes Mr. Chatterton, "seems to be that it should provide elementary instruction in drawing, carpentry, blacksmith work, and sometimes in weaving and rattan work as well. Whether there is any special need for these trades in the locality where it is proposed to start the school or not, does not seem to be considered a matter of any importance. And the invariable method employed to obtain pupils is the offer of scholarships of sufficient value to enable the boys to provide for themselves during the time they are in the school. The great bulk of the money spent upon such scholarships is wasted, for as soon as the scholarship ceases, the boy returns to his native village and takes no further interest in the trade in which he has been taught."

from the world, which have now to indent on the Punjab for workers in wood and metal; and Chota Nagpur, in the same plight, where the authorities have wisely established an industrial school for the production of carpenters and blacksmiths. But otherwise wood and metal should only be used for purely educational purposes, to such extent as the trade to be followed demands.

We have seen that at Bombay makers of art-carpets and art-pottery are turned out on the streets to check tickets in an omnibus; that at Madras boys are "learning a trade to get free instruction in drawing¹." In other provinces, the answer of nine out of the ten boys at the lathe and anvil to the question what trade they intended to follow was "Government service."

(d) *Only trades to be taught which can prima facie be improved*². It is very obvious that Government schools, supported by public revenues, should not be allowed to construct artizans which can be turned out equally well in their own homes. The eleemosynary school of the missionary may do this, but no other.

On the other hand, it is a clear gain to the country if the character of its hand-made articles can be materially improved at a State school. No one is more conservative than the Indian artizan; no one more wedded to traditional methods; no one more ignorant of modern improvement. To use all that is good in his own work and to provide him with all that is better from outside is one of the main objects of an industrial school.

(e) *Only those trades in which there is a prospect of a demand for the outturn*.—This principle is rightly pressed both by Colonel Clibborn and by Mr. Chatterton. "It is just as easy," remarks the latter, "to overdo the production of carpenters as the production of literary B.As," and there is obviously no advantage in teaching even a trade improvement if no market can be found for the improved article. "As it is," he adds, "the number of artizans in India is undoubtedly in excess of the normal requirements of the country, and, from a public point of view, there is no justification for any attempt to induce other classes of the community to seek their livelihood among the ranks of the already overcrowded industrial classes." This view may be accepted. The objection, of

¹In the School of Arts in Madras, for instance, the majority of apprentices in the Industrial Department are only learning the trade in order that they may get free instruction in drawing. And they have no intention whatever of practising the trades taught in the school in after-life.

²"Trades selected should be capable of improvement by expert instruction or the introduction of scientific methods." (*Colonel Clibborn's note.*)

course, disappears if an extended market can be found for an improved article or for an article which, cheapened by improved process or tool, can be brought within reach of a larger number of the community.

(f) *Only boys likely to follow the trade to be taught.*—Much has already been said on this subject. It is a question whether instruction should not be at first limited to the sons of artizans following the trade, and should only be extended to others in cases where there is prospect of material expansion in the market.

(g) *Payment the rule, exemption the exception.*—This rule may be neglected in the earlier stage of an industrial school, especially when a commencement is made with artizans' sons and with attempts to improve the manufactures. But as time goes on, payment should be enforced from all but children of very poor artizans. The principle was first put forward at the Calcutta conference, and is confirmed by Colonel Clibborn as the result of his experience. Free or scholarship-paid admission to industrial schools has indeed been one of the leading causes of their perverted use.

When positive improvements have been effected and a high price is obtainable for the outturn, the school will not fail to attract students of the right stamp who will be willing to pay for instruction. Some even of those classes whose aim in life has hitherto been the University degree may turn to the industrial and technical school as a better investment of their time and capital. Witness the staff of instruction in an industrial school in Bengal:—

	Rs.
The Principal—an engineer of the Sibpur College	80 a month.
The Blacksmith Instructor	50 „
The Carpenter Instructor	40 „
The B. A. literary Instructor	20 „

So at the Benares College the head gardener receives almost the same pay as the subordinate B.A. teachers.

It may be said that the B.A. of high caste would under no circumstances take to manual work. This is not true. In many of the workshops and foundries Brahmins are working at the anvil, and *per contra* not a few of our B.A.s are sons of cultivators and artizans.

(h) *No expensive installations or machinery.*—The railway workshops, private foundries and mills afford much better instruction

in the use of elaborate machinery than any that can be attempted in a Government school. Their useful influence in supplying the country with a sufficient number of trained mechanics has indeed been publicly acknowledged in the recent Financial Statement. It is unnecessary even if it were possible to supplement the work they are doing. "These machines," said Colonel Clibborn in inspecting the Lucknow School, "should be sold as old iron." They were machines only suitable for a large foundry.

(i) *Finished work should be turned out for the market.*—"This condition," observed Professor Ramsay, when with our Calcutta conference he visited the Sibpur College, "is essential for the success of an industrial institution." His remark was elicited by the information that the college students provided all that was required for the equipment of subordinate training schools—"bad work being returned." "You must," he added, "put your outturn to the test of the market." Throughout India I have found that competent experts insist that where the market test is not applied, instructors and students are liable to become careless not only as to the character of the work that is turned out, but also as to the time occupied in producing it.

(j) *Government to have no responsibility for the disposal of the outturn.*—The objections to Government officials assuming any share in financial and commercial transactions have been already stated in discussing the failure of existing industrial schools.

24. The problem of satisfying the conditions above enumerated is not an easy one. The nearest solution of Naples industrial school, it has been, however, found in the system adopted at an industrial school at Naples, on which an interesting note by Mr. Radice will be found in Appendix III. It was unfortunate that I had not this note with me in the earlier part of my tour for discussion with others, but, even had it been otherwise, I was not in a position to formulate the conditions for an industrial school until I had visited all provinces. It so happened that, when I came to Lucknow at the end of February, I found that the Lieutenant-Governor had convened a conference for the 11th March, which was to decide the *vexata quæstio* of the system on which the Lucknow Industrial School was to be worked as a model for other large towns in the province. Hitherto it had been a failure. After some troublesome delay, Sir Antony MacDonnell had obtained from England a competent master¹, and they

¹He had been five years manager of a large foundry, had been utilized by the Educational Department in giving technical instruction in their schools.

were ready for a start on new lines, but were embarrassed as to what the lines should be. Mr. Radice's note was read and was welcomed as a probable solution of the difficulty, especially as it agreed with the principles already formulated by Colonel Clibborn.

The later meeting in March has, I have been informed by Colonel Clibborn, decided to frame the scheme on the Naples plan, and will thus give a trial of an interesting experiment. The main points of the Naples system are that school training is separated from the workshops; that after three years the boys are transferred from the school to the workshops; that each workshop is managed by a master artizan on his own account; that he trains the boys as his apprentices; that finished work is turned out and sold by the master artizan; that financial and commercial embarrassments are thus avoided, while an opportunity is given for the manager of the school or, other experts, to watch the traditional methods employed in the trade, and to work out or suggest improvements.

The Naples school is very successful, and attended by 700 boys, who find ready employment in the trade they have learned when they leave the school. The following is a list of the master artizans who are now carrying on their trade on the school premises:—

1. Electrical fitter.
2. Bronze founder.
3. Printer and type-founder.
4. Cabinet maker.
5. Carpenter.
6. Silversmith and electro-plater.
7. Jeweller.
8. Watch-maker.
9. Astronomical instrument maker.
10. Physical apparatus maker.
11. Tinsmith.
12. Blacksmith.
13. Wood-carver and inlayer.
14. Mechanical Engineer.

It remains to be seen how far "master artizans" in India can be persuaded to set up their shop on Government premises. At Naples the inducements are the prospect of an increased sale for

their goods, and to do so a rent-free shop, but in India the additional bribe of a salary will probably be required. A difficulty which may have sometimes to be faced is a not unreasonable objection to expose the secrets of the trade. These are questions which will, it is hoped, be worked out at Lucknow. The most important advantage of the plan is, I think, the last-mentioned, that the processes employed can be watched, the tools examined, the forms of things made criticized, under the daily observation of an expert, with the view of introducing improvements in perhaps a large number of town industries.

In this plan only town industrial schools are considered. But the general principles are equally applicable to the case of country industries, which will be dealt with in other chapters.

CHAPTER IV

HIGHER CLASS TECHNICAL INSTRUCTION

25. I have already given a brief description of the Technological Institute at Bombay, and have suggested that an enquiry into its methods and results might be usefully made by experts with the view of ascertaining whether its imitation should be encouraged in any other large towns. The Baroda Institute should be included in the enquiry. Such institutions are widely established on the Continent and Great Britain, and their introduction into India is a subject which should be taken under the consideration of competent judges. While the technical instruction in them would vary with the needs of each province—it would not be necessary, in cases where the needs are the same, to reduplicate the instruction—a national institution would suffice. We have precedents in the Dehra Forest School, a national institution, which takes in students from all provinces including Burma; in the Veterinary School at Lahore which serves the North-Western Provinces, while that at Bombay is utilized by the Central Provinces,

26. Many native gentlemen are now anxious to promote technical education of the higher class and ask for Formation of a Committee to advise what technological instruction is required in this country, that a special enquiry in India and, if necessary, in Europe be made by a small but strong committee to advise what, if any, technological instructions for specialized training are required in the country, and to frame a working-plan which should be carried into effect when men and means are forthcoming. I am not at all sure that India is ripe for more institutions of the kind, but, if not, it would be equally advisable to obtain the positive verdict of competent judges that they are not yet wanted, and thus both prevent the useless expenditure of patriotic subscriptions on illusory projects and divert the money to practical schemes of ascertained value.

27. I am not competent myself to deal either with this question or that of the conduct of important technical institutions, such as Engineering Colleges, Deputation of a Committee to enquire into the systems adopted in the various institutions. Medical Colleges or the like, supported by Government. If any action be taken, it should be to depute a committee of experts to examine the system adopted in the various institutions and to report, for the information of the Local Governments, whether on a comparison of their working and results any improvements in administration, methods of instruction and of system, suggest themselves.

28. A similar enquiry might be profitably directed to the scheme of preparatory education leading to higher technical instructions. A considerable step in this direction has been made by the bifurcation of studies effected in the upper schools of all provinces, but it may be questioned whether the course intended to lead to technical professions is even now in all cases sufficiently specialized; whether too many useful sciences are not optional; and whether "practical methods" are not too much neglected. These questions should, I venture to suggest, be examined not merely by educational and administrative authorities, but by competent members of the professions to which the course is designed to lead with the object of informing those who are responsible for the scheme of general education what defects appear to exist in the present system and what needs still remain to be satisfied. As an illustration, I may mention that "the Madras Conference" suggested that "practical methods", i.e., the training of hand and eye by manual exercises, should be made compulsory in the ordinary schools for students

in the course leading to the medical and engineering professions, in both of which manual dexterity is desirable. It was even proposed that such instruction should be extended to the F.A. University classes.

29. A further question is that of special schools preparatory to the Engineering Colleges and Subordinate Engineering Schools. It is, I believe, contemplated to prepare for the subordinate classes of Rurki College in a section of the Lucknow Industrial School, while at Lahore there is an engineering class attached to the art school, which both prepares for Rurki and turns out engineers of subordinate class. Three subordinate schools are contemplated in Bengal, one of which is established. Again, there is a class for mechanical engineers at the Bombay Victoria Institute. The view I formed was that subordinate engineering schools were a desideratum, and, if this be so, the question is another of those which should be examined by the expert committee, who would be competent to deal with the subject of subordinate and preparatory engineering schools.

30. Descending to the question already alluded to for the instruction of higher class workmen in foundries and workshops, the only solution seems to be the institution of evening classes. Lahore seems to be the one place where they have been tried for native workmen with practical success, which would probably have been greater if the schools had been nearer the workmen's homes. At a meeting at Cawnpur which was held by Colonel Clibborn and myself with the managers of private foundries, the latter, admitting the need of teaching selected workmen, now always illiterate, how to make a "thing" from a drawing or plan, agreed to co-operate by refusing to promote workmen to posts requiring this qualification, without a certificate from the evening school in the event of one being established. Later enquiries made by one of the managers in all the city foundries led to the encouraging report that the workmen themselves would gladly take advantage of such a school "both for themselves and their children." Colonel Clibborn, on behalf of the North-Western Provinces Government, has since made further enquiries on the subject, and informs me that proposals have been submitted for the establishment of a night school at Cawnpur,

CHAPTER V

AGRICULTURAL EDUCATION

31. Agriculture as the leading industrial occupation of the country takes a prominent place in the discussion of technical education. However much the wealth of India may be increased by new or improved manufactures, it may be doubled by agricultural improvements¹. The declared policy of the Government of India has been to ascertain by a continuous series of experiments on Government farms (and otherwise) what improvements are possible, and meanwhile to so educate the agricultural population as to fit them to appreciate and accept ascertained improvements.

Education of the Agricultural population.

32. The problem is where and how to teach cultivators (landlords may be ignored for the present) these ascertained improvements. "Agriculture cannot be taught in the schools" write the Irish Commissioners: a proposition in which our Agricultural Conferences and the Government of India in 1897 agreed.

How to teach improvements in agriculture to cultivators.

[We do not think that Agriculture as an art, that is to say, practical farming, is a subject that properly belongs to elementary education. At present the study of what is called the Theory of Agriculture is compulsory for boys in all rural schools, and is highly encouraged by fees. But our inquiry has shown that this study consists, for the most part, in committing a textbook to memory; and we have come to the conclusion that it has little educational or practical value. We recommend instead that the course of Elementary Science to be taught in rural schools should be so framed as to illustrate the more simple scientific principles that underlie the art and industry of Agriculture. We also recommend the maintenance and extension of School Gardens, as a means by which these scientific principles may be illustrated and made interesting to the pupils. (No. V. "Conclusions" in *Irish Report*.)]

33. It is in the Central Provinces that the problem has been worked out. Thanks to Mr. Fuller, the village schoolmasters have been put through a six months' course on the Agricultural Farm, and taught there how to teach simple agricultural *ideas* to their rural schoolboys. When an improvement has been worked out on

Central Provinces system of Agricultural Education.

¹Compare Resolution of the Imperial series of March 1897 on "Agricultural improvements". At present India is exporting two of the principal manures used in civilized countries—bones and oilseeds—is neglecting a third—liquid manure—which America has proved is worth more than the solid manure, and is not making half the use that is possible of its rain water. Dr. Voelcker's book tells further tales,

the Farm; tested further on numerous estates under Government management; and been thus positively established, it will be carried through the schoolmasters to their former pupils, now cultivating their own lands, and willing, it may be hoped, to accept from the hands of their old masters the new experiment for trial in their own fields. Practical agriculture they have learned from the best possible instructors, their own fathers and their own people. "Improvements" only as they are worked out year by year, or it may be one in every few years, is it necessary to teach, for of them the conservative fathers know nothing. It is described in further detail in Appendix IV.

34. An illustration was given to me at Nagpur. Every year a staple rain crop, called *jowar*, is afflicted by a well-known blight called "Smut", of which the crop shows sometimes more, sometimes less, but still always some signs. A simple preventive worked out in America and elsewhere is to steep the seed in a solution of "Sulphate of Copper" sold in every bazaar. Tried on the farm, the soaked seed produced clean crops when all around were smut-diseased. The "schoolmaster students," 70 or 80 of them, were sent into a few hundred fields in the neighbourhood to count the heads of *jowar* destroyed in each acre—with the result that the average acre was found to have lost Rs. 4 worth of grain. This year the experiment is carried to the Court of Wards Estates. I may add that similar experiments brought out similar results at Poona where the estimated loss was between Rs. 2 and Rs. 3 an acre.

The above is an improvement which the simplest cultivator can try—the only difficulties are (a) to get the improvement to him, (b) to get him to try it, and it has been shown now how this can be done. If every cultivator in the Central Provinces were to soak his seed at a cost of 2 annas an acre; if smut were to be as bad as in the year of counting; and if (which may be a large "if") those schoolmaster students counted right; the total saving would be 80 lakhs, which is in round numbers the whole land revenue of the province.

The plan for the technical education of the cultivators is therefore (a) primary instruction in the ordinary school—sufficient, as already stated, to protect him against his natural enemies, the landlord, the money-lender, and the official, and enough to enable him to understand and appreciate improvements offered to him; (b) instruction in practical farming by his father; (c) instruction in improvements in his own field by the trained schoolmaster of the village.

35. Of agricultural schools we find two—one at Cawnpur, one at Nagpur. The primary function of both is to train that class of land-revenue officials (circle inspectors) whose duties are (a) to inspect villages and village officers; (b) to report to higher authority on all agricultural matters; (c) to give warning of agricultural disaster or of drought or famine; and (d) to supply statistics of the crops of the season. There may be 3,000 to 4,000 of such "circle inspectors" in India. At Cawnpur and Nagpur the students go through a two years' course on the Government farm. At Nagpur a six months' course is, as we have seen, given to rural schoolmasters, and at both students are trained for the management of estates under the charge of Government. The plan is sound and effective, and might be brought under the consideration of other Local Governments who were all required by the 1897 Resolution to establish at least one experimental farm under an expert, a step still not taken in some provinces.

36. Of agricultural colleges there are two (one at Madras, one at Poona) leading to an agricultural degree, at both of which the instruction is more theoretical than practical. The Madras College, associated with a Government Farm, has struggled through an existence of some 30 years, was severely criticised by a committee of enquiry under Lord Connemara, and has done very little in the direction of agricultural improvement. The Government of India were prepared to condemn it. But its retention has been justified by the plea that a thorough and practical education in agriculture and allied sciences, ending in a high class college diploma or in an agricultural degree, develops the intelligence of students just as well as the course for the B.A. degree; that it certainly fits them better for duties in the land revenue and cognate services and that it is very desirable to encourage the employment of men so trained. The plea is a good one.¹

The same plea was put forward in Bombay. "We want," it was written in a note submitted to the Bombay Government, "as officials in the districts, rather than technical experts, men who have had their thoughts directed to agriculture and whose minds have been taught to dwell on it; whose reports on the state of the crops, the imminence of famine, or the condition of the agricultural population will be animated by personal interests and intelligence of things agricultural; who, when endeavours are made to help the cultivating classes by a State loan, distribution of seed, and so forth,

¹The College will afford an opportunity for proving that an official thus scientifically and practically trained is a better official than a University B.A., and may thus stimulate our educational authorities to move still further than they have done in the direction of making the bifurcated course for the Science degree more practical.

or to stimulate them to adopt well-tried improvements, will have their zeal quickened by sympathy with and appreciation of the measures proposed."

37. The question of establishing official schools for the training of landowners is one which appears to deserve particular consideration. There may be some who would elect to go through the course of an Agricultural College leading, as in Madras and Bombay, to a University degree, but I doubt whether many would do so, nor is this the kind of training to which I wish now to refer. I mean that landowners should be given the opportunity of learning the administrative business involved in the management of an estate in some such way as His Highness the Maharaja of Gwalior was instructed.¹

Where there is in a province a Court of Wards school (as in Madras and the Central Provinces and formerly in the North-Western Provinces) or (as in the Punjab and Rajputana) a young Chief's College, this may be made the nucleus of a landowners' school. The boy need not commence his education there, though it might be better that he should, but would be provided with at least a two years' course, in which he could be properly prepared for his work in life. Surveying, village records and accounts, land-revenue law and procedure, and enough science and practical work on an experimental farm to develop an intelligent appreciation of agricultural improvement would be among the subjects taught.

And I would recommend also a strong infusion of educational handwork with some instruction in the principles of machinery and practice of engineering which would awaken interest in irrigation projects, waterlifts, roads, bridges and embankments, etc. As one officer observed to me, "If we could only get a landowner or young Chief to take an interest in a motor car instead of horse-racing or political excitements, it would be worthwhile to have such a school."

It would also be useful to take the future landowners on tours, on the Continental system, to visit agricultural farms, horse-breeding establishments, dairy farms, forests, irrigation works, such as the

¹The case of His Highness the Maharajah of Gwalior may be brought forward as to the value of specialized instruction. He was instructed in all the duties of a village officer and brought, with some pride, for Lord Lansdowne's inspection, the map of a village which he had surveyed with a complete set of statistical records which he had drawn up with his own hands. His favourite occupation is now the practical administration of his province, which has become a model for all Native States.

simple but effective system of dams carried out in the Gwalior State, and so on. Education conducted on these principles would be real "technical instruction."

At present a great deal of attention is given in existing institutions to physical training, cricket, football, and the like, with the laudable object of making the boy "manly". This is good in its way. But the young Chief or large landowner has seldom any opportunity of continuing these amusements when he leaves school, and would be much better off if he could also carry to his home some interests which would occupy his attention on his own estate. The tendency now is to anglicise him and create cravings which he cannot satisfy and which make the society of his own people distasteful to him. His Highness of Gwalior, on the other hand, has found his chief toy in a mimic State comprised of a few villages near Gwalior in which administration is practised on a miniature scale with the object of training his officials.

38. It is a regrettable fact that, with some few notable exceptions, the landowners of India take no personal interest in the improvement of their estates. Those that are educated, generally on the "one sided" system, take more interest in politics than in land. No interest taken in the improvement of their estates by landowners in India. In a district of the North-Western Provinces, in which there are an exceptional number of important landowners, Sir Alfred Lyall remarked that they had in 30 years become so rich through the agency of State improvements (railways and canals) that he dare not reduce their income by imposing on them the ordinary assessment of one-half the rentals, which they had themselves considerably enhanced. In the Settlement report accompanying his letter the chapter on "Landowners' improvements" was disposed of with the remark that "this chapter may be as short as the history of snakes in Ireland. There are none."

39. It may be urged that we cannot force landlords' sons to special schools any more than the proverbial horse to water. I cannot think it hopeless. I am sure that, if high authorities were to make an appeal to proprietors of light and leading, these would use their influence in support of the measure. The talukdars of Oudh, for instance, have continually urged the institution of an Agricultural College, and would possibly assist in a scheme for a landowners school, which would teach something more than agriculture. In any case, we have our Court of Wards school and Chiefs' Colleges in which to commence reform.

CHAPTER VI

ART AND ARTWARE SCHOOLS

40. The embarrassments which have arisen in Art Schools under past and existing systems will disappear if the "principles" enumerated in the chapter on Industrial Schools are applied to them also.

The first function of Art Schools is to maintain, restore, and improve Oriental art in all art industries and manufactures.

The working plan (suggested partly by the Principal of the Art School at Bombay) is the following:—

- (a) To complete, if necessary, the survey of the art industries of the province.
- (b) To select one or perhaps two of the best artizans in each industry and bring them from the locality where the industry is carried on to the Art School.
- (c) To set them to work, study their methods, teach them, if required, drawing, supply them where expedient with Oriental designs,¹ with better tools and appliances, and with forms which will best suit the market.
- (d) To arrange with local and municipal boards for the establishment of local schools, or rather training shops, where the instructed artizans will be utilized as teachers of other artizans and of their sons.
- (e) To frequently inspect the local training shops.
- (f) To assist the artizans to dispose of the outturn of the shops.

41. Samples of the outturn will be exposed in the Art School museum or in a private shop and serially ticketed so that visitors can always give their orders on what they see: orders would be distributed among the artizans who have been trained at the school. It would be preferable if arrangements could be made with European and native purveyors of artware to deal directly, on the

¹Books of these have been published by Colonel Jacob, of Jeypore, and by the Imperial Survey Department. They can be largely increased from the hand blocks which are now being thrown away by artizans and which should be collected and stored in the Art Schools before they disappear. I have bought them by the score for a few rupees.

above system, with the trained artizans—than for the Government official to supervise commercial transactions. Moreover, the private dealers could best suggest what are the most saleable “forms” for the market. This system was recommended by an Art Conference, which I convened some years ago, the proceedings of which should be consulted.

42. I was once associated with a capable native official in the establishment of a local school of the class described at Moradabad of which place the inlaid ware is well known. No attempt was made to introduce anything new, but two of the best workmen were directed to teach their best work and most approved designs to the boys of the trade. Forms most likely to suit the market were supplied to them. As long as the capable official remained, the Moradabad “training shop” was a pronounced success, and the character of the ware turned out throughout the town was materially improved.¹

43. Some provinces have no art schools, *e.g.*, the North-Western Bombay and Punjab Provinces and the Central Provinces. Perhaps the few art industries that exist there could be taken in hand by the Punjab and Bombay schools respectively².

44. Another question is the influence of art schools on architecture and building. Architectural drawing is more or less taught, optionally, in art schools, but what becomes of it afterwards and how many students make practical use of it? One art school at Lahore goes further than others in opening an engineering class, which includes practical as well as architectural instruction.³ The object in view is most commendable. But I venture to suggest that it would be more fully attained if (everywhere) the art school and the engineering school or college were to work out in association some plan by which all engineering students likely to be engaged as draftsmen, or otherwise, in architectural and building design,

¹A similar system was established by Mr. Goldstream at Hoshiarpur.

²Just as now Bombay trains veterinary students for the Central Provinces and Lahore for the North-Western Provinces.

³“In addition, there is at the Lahore School of Art an engineering class, who are taught elementary building, drawing, surveying, levelling, estimating, building materials, construction, printing, and revision of mathematics. This class prepares students for the First Examination in Engineering of the Punjab University.”

were to receive instruction by or under the direction of the art school, which would leave practical instruction to the engineering school.

45. It seems to be a pity that the lifelong efforts made by such a man as Colonel Jacob to collect all that is best in Oriental architecture in Northern and Central India in volumes admirably suited for teaching architectural and building designs of Oriental character (and which *are* thus utilized in foreign countries) should be ignored in India. I myself tried to follow in Colonel Jacob's steps by launching the Indian Art Journal and the Art Series of Oriental architecture and design by the Survey Department, both supplied at very low prices—and the latter, at any rate, specially intended for schools. I contend that these should be utilized in all preparatory engineering schools and in all engineering colleges and perhaps in some of the ordinary schools. The utilization of Colonel Jacob's collection and the Survey Art Series might also be commended to the authorities at Cooper's Hill in view of the probability that our Indian Engineers might thus become imbued with the spirit of Oriental design. I trust too that the financial support which has been to a great extent withdrawn from the Art Journal may be restored.

The subject of which I have now treated might be dealt with by the committee of Engineer experts which I have recommended in a previous chapter.

CHAPTER VII

RECOMMENDATIONS

I. That technical education and industrial schools should be placed under the control and direction of a separate department, which may be called the technological department, in each province.

II. That there should be constituted a separate technological branch of one of the imperial departments, which should generally control the administration of the provincial technological departments.

III. That (in accordance with the original intention of the Home Department in 1888) the immediate measure should be taken of requiring each Local Government, whether at its own or at imperial expense, to nominate an officer for six months (June to December) to complete or revise the industrial survey of 1888 and to select those industries which appear to be capable of improvement and encouragement.

IV. That the officers thus nominated should be brought together at a conference in (say) January 1902 to discuss with the imperial department concerned the action which should be taken.

V. That the opportunity of the conference be utilized to discuss and dispose of the various suggestions which have been made in each chapter of Part II.

VI. That special attention be given to the discussion and criticism of the principles on which industrial schools should be conducted as formulated in Chapter III of Part II.

VII. That the principles, when finally determined, should be recommended to all Local Governments for observance in the conduct of industrial schools.

PART III

ENCOURAGEMENT OF COUNTRY INDUSTRIES

CHAPTER I

EXISTING INDUSTRIES

The industrial survey made in accordance with the Home Department's instructions of 1888 led to the conclusion that there were many industries which were *prima facie* capable of improvement; that in some, either improved processes or better tools and hand machines hitherto unknown to the artizan could be applied; in others new forms required by a market which the local workman has no opportunity of studying could be suggested; and so on¹. The conclusion is confirmed by my present enquiries.

2. It is impossible for me to suggest in this report what action should be taken in respect to each industry or even to select those which should be taken up for special investigation. I can only name a few to which attention has been called at provincial conferences [cotton weaving, silk weaving, basket making, hand block printing on fabrics, cane and straw work, metal casting, oils and varnishes, glass, dying, bleaching and colour printing, plumbing, cart making (in backward districts), sericulture, wood engraving, tile making, carpet and mat making, locksmith work, pottery, toy manufacture, button making, and various art industries]. I must confine myself here to an outline of the general plan of action which should be adopted.

3. A working-plan was suggested at the commencement of my tour by the Bengal Conference, and has been received with general favour elsewhere. It would involve the following action:—

- (a) That there should be established in each province a technological branch of some existing institution, *e.g.*, of the School of Art, Engineering College, or Agricultural School².
- (b) That this 'branch' should be placed under the direction of a technological officer.

¹Mr. Collin's report for Bengal is full of useful suggestions. But almost every report supplies much useful information.

²The Central Provinces has no School of Art and no Engineering College, nor has Assam.

- (c) That his duties would be investigation, suggestion, and control of action.
- (d) That an industry selected for investigation should be dealt with at the central institution.
- (e) That, where necessary, an expert should be obtained or imported to examine the existing methods of manufacture and process, and to suggest improvements.
- (f) That experiments and trial should be made until improvement, if such is possible, is positively established.
- (g) That one or two selected artisans should be brought from the locality where the industry is carried on and taught the improvement at the central school.
- (h) That a "special school" should be established by a municipal or local board for the teaching of the improvement to the local artisan.
- (i) That the selected artisans who have been instructed at the central institution should be the teachers.
- (j) That the 'schools' should be inspected from time to time by the 'technological officer', who would see whether proper instruction is given; suggest further improvements; and ascertain generally whether the improvement already introduced is successful.
- (k) That where an improvement involves capital outlay, advances should be given to the artisans.

It will be observed that the above scheme is in accordance with the principles already formulated for the conduct of industrial schools, and that it is only intended for hand industries which do not require elaborate or costly installation.

4. The special school of the locality will often involve no building or installation. Thus the working of an improved handloom, supplied on the advance system, could be explained in an hour or two under a tree. An improved process could be taught in a few days under an improvised shed, and so on. In other cases which involve more detailed instruction or the prolonged teaching of boys, a building would be required.

5. An illustration was brought forward at the Bengal Conference of the working of the plan. Basket, cane and straw-work. Basket, cane and straw-work is an industry which affords occupation to large numbers in those parts of Bengal which produce grasses, rushes, and canes. The workers are very dexterous, but some of their methods are clumsy, and they

have no knowledge of the forms demanded by the present market (such as, for instance, straw hats, chairs, travelling baskets, etc.). There seems, therefore, to be a satisfactory opening for action in this case.

6. It was suggested that an expert should be imported from Switzerland, China, or Japan, to give instruction in processes unknown to the local artizans, and in forms which would find a sale in the Calcutta market. The expert would be utilized at the central institution for instructing the few artizans selected to teach at rural schools which would be established by local boards in the basket-making districts.

7. In the case of these hand industries, as in that of art industries, the policy, already recommended, of avoiding reduplication of expense should receive attention. Thus if an expert be imported and prove successful, selected artizans may be brought to him from another province, or he may be himself passed from one province to another. The latter was the course taken under my direction in connection with the dairy expert imported by the Agricultural Department from Sweden, who, after a given term, was passed from the Bombay Presidency to the North-Western Provinces. He was to have been transferred to other provinces, but that his success in teaching natives, who on the Bombay side have now widely taken up the industry, induced him to set up an establishment of his own at Aligarh in the North-Western Provinces.

The success attending the importation of a dairy expert from Sweden is a great encouragement to similar action in connection with other industries.

8. One conclusion to be drawn from these remarks is that the action in the various provinces should be co-ordinated, and that this can only be effected by the direction of an imperial or central organization.

CHAPTER II

COMPETITION WITH IMPORTS

9. In establishing new industries, and in encouraging some of those that exist, it is safer and more economical to deal with those which will compete with

imports than with those of which export is the object. For the former require only organization in India, whereas the latter require it both in India and abroad.

10. A second consideration is that in effecting improvement in an existing industry there is little advantage gained unless a wider outlet can be found for the industrial product, and this can best be secured in what may be called the import market.

Improvements in existing industries.

11. The first step is for the technological officer to make a list of those imports which can *prima facie* be manufactured in this country, and in doing so to enlist the co-operation of native associations. One industrial association at Calcutta has already offered its aid, and another is, I understand, being formed under the direction of Sir Harnam Singh with similar objects. The custom house schedules will provide statistics of those imports which meet the needs of the native population, which, though individually small, form in the aggregate the largest demand. Something, of course, has already been done in this direction. Umbrellas, for instance, an extensive import, are made after a fashion at Calcutta and elsewhere, but admit of much improvement under expert instruction. Locks, travelling boxes, lamps, mirrors, spectacles, afford similar illustrations. The Bengal Conference suggested hosiery, now much used by the upper native classes, and hats of all kinds. Many more articles used by natives and Europeans could be enumerated. In none of the cases mentioned does it appear that the native artizans have received any expert teaching or guidance. They have worked their way in the manufactures by crude imitation without the advantage of the best tools or the best processes, and the consequence is that their products, although from their low price finding a market, cannot thoroughly compete with imports from Europe.

First steps to be taken.

12. As Mr. Chatterton has pointed out, the two main advantages of the Indian workman are his cheapness and his dexterous manipulation. Of these the fullest use should be made under expert instruction. A case in point is the manufacture of scientific and mathematical instruments. Taught first at the Survey Department at Calcutta, at the Rurki Engineering College, at the Canning College at Lucknow, etc., the manufacture of instruments which are said to be as good as the imported article supplied by the best European firms is now independently carried on in the bazaars.

Use to be made of the main advantages of the Indian workman.

13. A minor advantage which many articles "made in India"

Advantage possessed by articles "made in India." possess, especially where wood enters into the manufacture, is that they stand the alterations of heat and cold better than the articles "made in Europe". Thus the spokes of carriage wheels imported from England, however well the wood is seasoned, shrink (and therefore rattle) much more quickly than those of wheels constructed in India¹. Photographic cameras are another case in point, those of Indian make proving much sounder than the imported ones, and that these can be made by a native artizan, as good as the best from Europe, has been proved at the Rurki College.

14. Instruction in the smaller manufactures, especially in those

Expenditure required for instruction in the smaller manufactures. which supply the needs of the bulk of the native population, require, as a rule, no material expenditure beyond the importation of an expert, the purchase in some cases of material which can only be obtained in Europe, and (in the initial stage) advances to the artizan. But there are others which in the initial stage entail large outlay that must be provided either by Government or by wealthy members of the community. In the case of several important industries, which have now been successfully launched, Government has led the way in order to meet the requirements of the army, either by itself undertaking the experimental work or by subsidizing private enterprize with large army and police contracts. The following may be mentioned as instances of manufactures which have been thus successfully established: tea, leather, woollen fabrics, tents, sugar, rum, beer, soap, brushes, and aluminium. In tea, leather, and aluminium Government undertook initial experiment.

15. The inference is that, if Government urged to action by

Private enterprize checked by dread of initial cost. its own special needs, was successful in launching the enumerated manufactures, it might be equally successful if, urged by the needs of the country, it took similar action in other cases. Private enterprize is always more or less checked by dread of the cost of initial experiment, and not having any object in view but quick dividends (the advantage to the country being, of course, no consideration), holders of capital prefer to put their money into assured business and hold back from new undertakings to which Government give no direct or indirect support. In the meantime, the needs of the market are met by foreign manufactures.

¹This was borne out by experience in the Egyptian war, when gun carriage wheels made at Fatehgarh stood the dry heat much better than wheels from England.

16. In cases where steam power is involved, it may be objected that the aim now before the Government is Development of manufactures produced by steam power. the promotion of native *hand* industries, not the development of manufactures produced by *steam* power. The answer would be that in all cases where steam manufactures are imported it is of advantage to the industrial classes to replace them by manufactures produced by steam in India; that a factory gives new employment to various classes of skilled or specially trained workmen; and that the profits of the shareholders in India which take the place of the profits of capitalists in Europe are frequently utilized in launching further factories.

17. Another objection which may be raised is that the Government cannot supply State capital for initial Encouragement to be given to benevolent institutions to undertake initial experiment. experiment in launching or assisting manufactures from which it would itself derive no direct benefit; whereas in the cases enumerated its aid was justified by the prospective reduction in annual expenditure on the army and police. But *qui facit per alium, facit per se*. A great deal can perhaps be done by encouraging benevolent associations to undertake initial experiment; by providing them with professional advice and assistance; by obtaining for them, at no great cost, competent experts from abroad; by establishing training schools; and by rewarding with State honours and decorations those who take prominent action in promoting the interests of the country.

18. It is nevertheless the opinion of some, in which I am disposed to share, that the Government would be Government justified in providing for promotion of industries in India. justified in providing, for promotion of industries in India, a definite assignment annually from the State revenues.

19. There is one class of special industries to which allusion has been made in which I would suggest that Systematic aid to be given to certain industries. more systematic aid should be given by our scientific institutions. I have already shown that in some cases native artizans have been successfully taught to make scientific instruments and appliances; my suggestion is that selected scientific institutions should have attached to them a technological school of applied science in which various industries which involve scientific processes, high manipulative and artistic skill, and the use of delicate instruments should be taught in three sections: (a) the manufacture of instruments, (b) the use of instruments and processes, and (c) the development of processes.

20. Photographic work is a case in point. Photography in all its branches has been worked out to a high level of perfection at the Survey office in Calcutta (by Colonel Waterhouse) and at Rurki (by Colonel Clibborn). But Colonel Clibborn has also led the way in (a) instructing outside students in photo-mechanical processes, (b) improving the construction of apparatus by native artizans.

21. The idea involved in his action should be more extensively exploited. There are many other arts to which science is applied, such as electro-plating, lens grinding, gilding, nickel-plating, X-ray working, etc., in connection with which the construction and use of physical instruments might be taught. The schools would not be, like Mr. Tata's institution, schools of research, but schools for applying the results of research. They would, however, give an opening to Mr. Tata's men as instructors. The following remarks are taken from a note by Colonel Clibborn on this subject:—

There is a wide gulf between the experimental results arrived at by an investigator in a Research Institute or Laboratory and the commercial application of a process. The Rurki Applied Science Department is intended to assist in bridging this gulf by selecting suitable experimental data and working out the commercial process when this is possible. Industrial apprentices help at the operations, and get a certain amount of training thereby.

At the same time, certain high class industries requiring considerable technical and artistic skill are carried out by the Department. As yet the industries thus commercially worked have been confined to those connected with photo-mechanical process work, and although this line of itself embraces a very large variety of work, there is no reason why the system should not be largely extended.

22. In some branches of Applied Science a school of this kind would be attached to an Engineering college; in some to the Survey office; in others to the School of Art². The first practical step, however, to be taken is to draw up with the assistance of experts a list of the industries which could be appropriately dealt with in a Government technological school. And when the selection has been made, care should be taken that unnecessary reduplication of instruction does not occur.

¹This view was brought forward by Mr. Pedler at the first Bengal Conference.

²The retouching of photographs, could, for instance, be taken up at the School of Art. The growth of photography has created a great demand for skilled 'retouchers'.

Rurki, for instance, would provide instruction in any applied science it takes up for all Northern India.

23. Technological schools of a more ambitious character, such as the Victoria Jubilee Institute at Bombay, which involve large outlay, require, as I have elsewhere indicated, native co-operation, and would never be brought under direct official control.

Larger technological schools not to be brought under direct official control.

CHAPTER II

ENCOURAGEMENT OF EXPORTS

24. The encouragement of exports, as I have said, requires an organization abroad, *i.e.*, in Europe and America. This cannot be undertaken by Government, who, if it takes any measures, must do so through private commercial agency.

Measures to be taken through private commercial agency.

25. In dealing with the improvement of art industries, which include art fabrics as well as artware, I represented that one, amongst other conditions to be satisfied, was that an extended market must be found for the outturn. There is not much room for expansion in India, although some demand may come from those visitors to the country who prefer to purchase good rather than inferior articles. But a large demand can only be looked for in Europe and in America, especially perhaps in the latter.

Markets in which a demand for artware can be looked for.

26. The demand will vary according to changes in fashion, and its fluctuations can only be tested by those in the trade. The first point is then to ascertain who is in the trade. Mr. Tellery is undoubtedly the most important of the purveyors abroad in the handmade products of India, and deals in classes of goods which are not taken up by other purveyors, who are, I think, all Parsis dealing in artware and minor art fabrics, whereas Mr. Tellery does a fairly large trade, which is capable of much expansion, in fabrics which would not come under

Traders in artware.

the designation of art fabrics, but which deserve as much, if not more, encouragement.

27. I have watched Mr. Tellery's career from its humble commencement when he was brought out by Colonel Hendley, I.M.S., to teach Jeypore artizans how to cut garnets. His expanding success in exploiting artware and fabrics throughout India and Europe led me to have such confidence in his industry and ability that I obtained the consent of the Government of India to assist him to represent Indian industries at the Chicago Exhibition. The grant-in-aid was inadequate, Rs. 10,000 I think, but the Government of India had not then taken up the question of encouraging Indian exports. Mr. Tellery lost heavily, but the enterprize served as an important advertisement, and was useful in establishing a connection between Mr. Tellery and American dealers. Nevertheless I consider that the use which we made of Mr. Tellery, the loss he incurred, his own energy and ability, and the extensive commercial relations which he has established abroad, justify the Government of India in supporting his further efforts, provided that this can be done without injury to competing dealers.

28. Mr. Tellery informs me that he does not ask for direct financial assistance; that if a company can be formed in which he would be, I understand, managing director, he would be satisfied with indirect aid and encouragement. If it were open to other purveyors to associate themselves with such a company, perhaps ways and means could be found, without offending against the non-interference canon, to give substantial assistance. A note of my interview with Mr. Tellery will be found in Appendix V.

29. I believe that the question of forming a Company is receiving the attention of a syndicate, under the presidentship of Sir Harnam Singh, K.C.S.I., at Calcutta in communication with Mr. Tellery.

30. I cannot pretend to decide what form assistance should take. The matter is, I believe, under the consideration of the Government of India. But I venture to suggest a working-plan for the improvement and exploitation of Indian artware and art fabrics which may, at any rate, serve as a basis of discussion. It is this—

- (a) That a special grant should be made by the Government of India (or by the Local Governments) in aid of the

industrial and country trade schools of which the establishment is recommended in previous chapters.

- (b) When through the school agencies satisfactory work is turned out by the artizans of the locality of which the art character is approved by the art school directors (our only official experts), samples should be supplied to—
 - (1) The museum of the province.
 - (2) The imperial museum at Calcutta.
 - (3) Such emporia shops and museums as may, at the request of the Company (and other dealers), be, with the approval of the Government of India, selected in India or abroad.
- (c) That all such samples should be ticketed with numbers and descriptions, of which a provincial register should be maintained in the provincial art museums, and a complete register of samples from all provinces in the imperial museum at Calcutta.
- (d) That Dr. Watt or his successor should, with the aid of an expert assistant, control the organization. No one could frame the scheme better than Dr. Watt himself.
- (e) That a Committee should be formed at Calcutta, of which all art school directors should be *ex-officio* corresponding members to examine the samples; to decide finally whether they are to be accepted as fair specimens of Indian art; whether the price charged is reasonable; and so on.
- (f) That Mr. Tellery's Committee or others should undertake to advise Dr. Watt what forms are most required for the market.¹
- (g) That all articles provided by Government organization should be "hall-marked."

¹Stereotyped forms, sooner or later, become unfashionable. What more than anything is required is the adoption of Indian art *forms* suited to foreign requirements. Mr. Coldstream, C.S., successfully exploited this idea in Hoshiarpur inlaid work, which was adapted to tables, chairs, book-shelves, etc., and other European furniture. Again, Mr. Tellery's carved plaques of a certain size and make were accepted by furnishing firms in America for working into walls and wainscots. So in my house (North Bank) in Simla there is a room in which roughly made, cheap, but very effective thin strips of Cashmere carved deodar (effective indeed because rough) are on the applique method fastened on the wooden outlines of doors, windows, posts, etc. Again in Calcutta I bought a number of discarded handblocks of excellent design and gave them to a man in the trade to print the edges of plain cotton fabrics with the two cheap

31. The State assistance which is suggested in the above working-plan is aimed at the maintenance of a proper standard of Oriental art in exported wares and fabrics. It would not involve interference with free trade or competition with private enterprise. The outlay would be the salary of an assistant, with office, at the Imperial Museum and the purchase of a number, at present indefinite, of standard samples. The system proposed was, as I have elsewhere noted, approved some years ago at an Art conference which I convened to discuss this and other subjects, but in the absence of organization and funds support was not given to the scheme. The association of Dr. Watt with Mr. Tellery, both proved organizers, would, I think, lead to the project taking definite shape.

State assistance aimed at the maintenance of a proper standard of oriental art.

32. There is nothing in the scheme to prevent what may be considered inferior art-ware, etc., being exported. Nor can the Government attempt the prevention. All it can do is to provide the purchasing public with the best standards and leave them to decide what they prefer.

Prevention of export of art-ware not to be attempted.

33. The same argument applies to that class of trade into which Oriental art does not enter. Mr. Tellery, whose agents abroad study the market, receives indents for fabrics either plain or of European patterns and of colours which purchasers want. This is a section of the export industry which, as giving employment to a large number of artizans, deserves State encouragement. The best encouragement is the promotion, by Government influence, of a company which would find the requisite

Encouragement to be given by establishment of schools.

Indian dyes, yellow ochre and al: the fabrics being shaped for use as curtains in European houses. They were speedily sold. Handblocks have the advantage over machines in enabling quick changes to be made in patterns.

The merits of the al-dye, when known, might lead to an extended use of al-dyed fabrics. The colour is pleasing and fast. One of the most attractive exhibits in the Indian Court at the 'Colindines' in 1886 was a pair of al-dyed curtains from the Central Provinces, but its exceptional merit is its antiseptic qualities, which keep off insects and moths. Bankers' books and village records are universally wrapped in al cloth (Karua), and water carriers use it as a waist cloth to protect them from skin diseases which foul water would give them. The dye cannot be made in Europe, as the root from which it is produced is too heavy for export.

Mr. Tellery himself has sent considerable quantities of al fabrics (without art patterns) to America as wall-cloths on account of the pleasing colour. I have given the above as examples of cases in which the outside market has to be studied by experts, who must be allowed to suggest the *form* wanted.

capital for expanding a trade which Mr. Tellery or others have successfully launched. Government could hardly associate itself with it in any direct way. But it might find it possible to afford indirect assistance by opening schools for workmen and their sons which would feed the establishments which are required by the company, or by any others who may want trained workmen. Mr. McRobert is now promoting a preparatory school for boys to be employed in the mills and factories of Cawnpur which will be conducted on the Kindergarten, hand-and-eye, and manual training principles, and at Lucknow the industrial school is to teach improved methods both to artizans' sons and adult workmen. An amalgamation of the two ideas (preparation and improvement) forms the industrial school of perfection, and it would appear to me that it would be a service to the country from an educational point of view if the Government of India were to establish, in connection with the company, artizan schools of the type which enquiries seem to prove is the best, as an example to all Governments.

34. In the preparatory school a proviso would be that no more literary education should be given than is approved by the company. Mr. Tellery would probably say, as most of the workshops superintendents do, "none at all," but there are a certain number, at any rate, who would benefit by instruction in drawing and design, and as time goes on, it would perhaps be found that some literary instruction combined with drawing and other hand-and-eye methods (differentiated according to the trade to be followed) does improve the general intelligence of the young workmen. Mr. Chatterton reports from Madras that some of the best missionary school managers are coming round to the view that, as a preparation for trades, the hand-and-eye and manual training methods do away with a great deal of the objection to the so-called "literary training" which frightens equally workshop managers and artizan fathers; Mr. McRoberts at Cawnpur welcomed the plan as solving his difficulty; and Colonel Clibborn at Rurki has given it his support.¹

35. The main objects, however, of the schools would be to improve the industries, whatever they may be, of which the company (and others) require the products for export, and whether the preliminary training of the children is to include much, little, or no

¹The three gentlemen I have named are the most "practical" of all authorities I have met in India.

literary education, the essential matter would be the establishment of school workshops. The leading conditions would be:

- (a) That each school should be in the locality where workmen of the class required are to be found.
- (b) That the instructions should be by master artizans selected by the company.
- (c) That the company should decide as to methods, processes, kind of work to be turned out, and so on.
- (d) That the outturn of the school workshop should be bought by the company (or others) at prices settled by rule or arbitration, the Government bearing any loss for inferior work.
- (e) That the boys should, whenever indented for, be transferred to the workshops of the company or of any other exporters.
- (f) That, when required, adults should also be trained in drawing, etc., etc.

36. The schools now suggested, in association with the assumed "export company," would, if established, form a section of schools running on parallel lines with art schools and industrial schools of the proposed Lucknow type. They would be based and conducted on the same principles, and would all of them provide more or less outturn for export.

37. As part of an organized scheme of industrial schools throughout India to which any artizan's sons may be admitted, they would not be open to the objection that they are designed to favour any particular firm or company. Nevertheless, the first "export company" that takes the field would, by associating themselves with Government in establishing the schools, gain an indirect support which might be useful to them as well as the advantage I have suggested of obtaining Government assistance in the trial of experiments of which they would be the first to reap the results.

38. It is unfortunate that the encouragement of the weaving industry presents many difficulties, more probably than any other industry that can be named. The subject is dealt with in Appendix VI.

CHAPTER IV

RESUME OF RECOMMENDATIONS FOR INDUSTRIAL AND TRADE SCHOOLS

39. In concluding this report I desire to draw renewed attention to the fact that all the schools which have been recommended for the improvement and encouragement of industries, whether country art industries, town industries, existing country industries, industries to compete with imports, or industries to promote exports, are based on the same principles, of which three of the most important are:—

- (1) That work is turned out for the market (as recommended by Professor Ramsay).
- (2) That instruction is given by professional experts (either the master artizan or the imported expert).
- (3) That opportunity is given to improve the industry.

I will briefly recapitulate how these principles are in each case applied.

(1) *Country art industries*.—Adult workmen are brought up to the school of art or other central institution to be taught improved tools, methods, shapes, and patterns. It is at this stage that the first opportunity is given to improve the industry. But the instruction of the adults does not constitute the industrial school. One or two of the instructed adults are returned to the locality from which they were brought; and it is there that the industrial school will be established at which the trained adults will instruct boys who belong to families who follow the trade or, if there is sufficient competition, other boys also. The school will work for the market, under some arrangement to be made with the master artizans. Periodical inspection will give a further opportunity of improving the industry.

(2) *Town industries*.—These may sometimes include art industries. In the town the adults and boys can be taught under the same roof, especially if there is a school of art in the place. But the main industries will probably be of a purely industrial character, such as brass work, cabinet making, etc. On the Naples system, to be adopted, it is hoped, at Lucknow, all the principles are observed. Instruction in each trade is given by master artizans who work for the market on their own account under the eye of a European expert competent to suggest improvements.

In reality, this town school is nothing more than a congerie (under one roof in separate rooms or shops) of schools of the country type. The town school has, however, the advantage of keeping the master artizans permanently, instead of temporarily, under the eye of the European expert.

Like Colonel Clibborn, I cannot conceive any other type of town industrial school that would fulfil all the conditions which have been formulated in the chapter on industrial schools, and none of which can, in my opinion, be properly surrendered. Some provincial authorities with whom I have corresponded since my tour on the subject have not accorded their approval to the plan, but I cannot see what they have to put in its place. I strongly recommend that Mr. Radice should be allowed, sooner or later, to explain the system personally to local authorities, for I am convinced that we have here the solution of the problem of the town industrial school, with the precedent of its enormous success at Naples, a town more akin than any other on the Continent to the Oriental type, where 700 boys are continuously under instruction. One educational officer disposes of the suggestion with the remark that the 'Naples school appears to be an eleemosynary institution.' It was originally, but this is no longer the case. The boy's parents pay the major part of the cost, although the school receives some support from the Government and subscribers. But then all the so-called industrial schools, now established in the Indian provinces, are *entirely* supported by Missionary, Local, or Government funds, and the Naples type is, therefore, a step, and a large one, towards the acknowledgment of the principle that "pay should be the rule, exemption the exception." Competition for entrance into the Naples School is now very keen, and as time goes on, I hope this will be the case in regard to town industrial schools of the same type in India.

(3) *Existing country industries.*—The system is the same as for country art industries, on the understanding that an imported expert will take the place of the Art school expert for the training of the master artizans who will be employed to teach at local schools. The plan of local trade schools under the teaching of the instructed master artizan is the only one which seems to hold out any prospect of success, and this view was accepted at all the Provincial conferences. Logically this acceptance involves the acceptance of the principles involved in the Naples type of town industrial school, and Provincial authorities who accept the former and reject the latter are hardly consistent.

(4) *Industries to compete with imports.*—Here wider action is required, though fundamentally the same principles apply. Take

what I have permitted myself to call Mr. Chatterton's Aluminium school as an example. He trains both adult workmen and boys, turns out completed articles on behalf of Government for a market, and works out improved processes. But the time is coming when he will only need to instruct master artizans, when these will, either on their own behalf or on behalf of capitalists, work for the market, and may be employed under the system described for schools of types 1, 2, and 3, to teach in their workshops boys who wish to follow the trade.

Take again Mr. Tellery's proposal to introduce button-making. Experts would be imported to teach adult workmen (*e.g.*, selected wood turners in the Bombay Presidency), some of whom would, when taught, be utilized as instructors of boys in a trade school. Financial responsibility undertaken by the Government in the initial stage would, as in the case of aluminium, be eventually transferred to capitalists or to such a company as Mr. Tellery desires to establish.

(5) *Industries to promote exports.*—The system would be exactly the same as in the case of imports, except that the assistance of capitalists or of a company must be obtained at an earlier stage in the view of the fact that Government officials cannot be associated with the exploitation of manufactured articles in foreign countries.

But in the initial or experimental stage the Government can take a large share (a) by importing experts, (b) by providing funds or grants-in-aid for experiments, and (c) by establishing, when success has become probable, schools both for adults and boys—(a) and (b) will constitute temporary aid, but (c) will or may be permanent.

I cannot conclude this chapter better than by quoting the following notice of a report recently issued by the Board of Education at home, in which the principle is laid down that trades cannot be efficiently taught without a school:—

An interesting report on technical schools on the Continent has just been issued by the Board of Education at Home. It is written by Mr. James Baker, who, on behalf of the Board, visited a number of technical schools in East Prussia and in Russian and Austrian Poland and Bohemia. The account Mr. Baker gives of what he saw will help to explain why England can no longer claim the monopoly she once possessed of modern manufactures. Austria and Germany alike have set themselves seriously to train up their subjects to be something better than hewers of wood and drawers of water. The programme of both Governments is to spread widecast scientific and technical and artistic training, and they are doing it. In England people are still content to repeat that trades cannot be taught in a school. The Austrians

and Germans have discovered that trades cannot be efficiently taught *without* a school. In many towns employers are required to send their apprentices to a technical school for a certain number of days a week, and a breach of the law is followed by fine or imprisonment. Nor are the schools confined to a few large towns. In Austria, in particular, a great point is made of carrying technical training to the small towns and even to the villages.

[*Home-Education A Proceedings, December 1901, No. 20*]

6

LETTER TO LOCAL GOVERNMENTS REGARDING ENCOURAGEMENT OF TECHNICAL EDUCATION.

Extension of technical and industrial education in other than higher forms urged—schools of art to foster arts and industries of country—working of industrial schools—aluminium industry in Madras—technical scholarships for further studies in higher branches of technical education proposed—

FROM

J. P. HEWETT, ESQ., C.S.I., C.I.E.,
Secretary to the Government of India.

TO

THE SECRETARY TO THE GOVERNMENT OF
MADRAS, EDUCATIONAL DEPARTMENT.

THE SECRETARY TO THE GOVERNMENT OF
BOMBAY, GENERAL (EDUCATIONAL) DEPARTMENT.

THE SECRETARY TO THE GOVERNMENT OF
BENGAL, GENERAL (EDUCATIONAL) DEPARTMENT.

THE SECRETARY TO THE GOVERNMENT OF
THE NORTH-WESTERN PROVINCES AND OUDH,
EDUCATIONAL DEPARTMENT.

THE SECRETARY TO THE GOVERNMENT OF
THE PUNJAB, HOME (EDUCATIONAL) DEPARTMENT.

THE SECRETARY TO THE GOVERNMENT OF
BURMA, EDUCATIONAL DEPARTMENT.

THE HONOURABLE THE CHIEF COMMISSIONER OF
THE CENTRAL PROVINCES.

THE HONOURABLE THE CHIEF COMMISSIONER OF
ASSAM.

Calcutta, the 20th November, 1901.

Sir,

I am directed to address you with special reference to the

Practical and Technical
education.

Resolutions passed by the recent Educational
Conference at Simla in regard to Technical
education. This matter has already formed the

subject of a report which was prepared by Sir Edward Buck after investigating the subject during the cold weather—1900-01, a copy of which is forwarded herewith. Speaking generally, a good deal has already been done in India for Technical education in the higher forms. There have long been excellent Medical and Law institutions in the country, in addition to the Colleges for the training of engineers, mechanics, electricians, overseers and surveyors, Government officials in the Land Revenue and Forest Departments, veterinary officers and teachers in Technical Schools, as well as foremen to be employed in railway workshops, cotton-mills, mines, and similar industries. The Government of India have no fault to find with the general principles upon which these institutions have been established and conducted. Their maintenance and further development are matters of the utmost importance, towards which the attention of the Local Governments concerned should be continuously directed; but they are already to a large extent doing the work that is required of them, and what is most urgently needed is the extension of Technical and Industrial education in other directions.

2. Local Governments and Administrations have not been backward in the encouragement of Technical and

Schools of Art.

Industrial education of different kinds.

Schools of Art have been established by the State at Madras, Bombay, Calcutta, and Lahore, and almost every variety of Technical and Industrial School has been attempted in one Province or another. The question whether Schools of Art should continue to be maintained by the State was discussed in connection with Lord Kimberley's Educational Despatch No. 128, dated the 9th November 1893, and the Report of the Art Conference, which was assembled in Lahore in 1894. The conclusion of the Government of India was that in the then existing stage of Technical education, it would be a mistaken policy to insist on casting all the provincial arrangements regarding Technical or Art Schools in the same mould. They considered it desirable that each Province should work out the scheme for such institutions on its own lines, and anticipated that the experience thus gained would facilitate the formation of broad and general conclusions. In his Educational Despatch No. 9, dated the 6th February 1896, the Secretary of State agreed that it was inexpedient to withdraw State aid and control from Indian Schools of Art, and that public expenditure on them is justifiable on condition that they are so directed as to be really beneficial to Indian art. After stating that instruction in drawing should from all points of view find a place in a School of Industrial Art, Lord George Hamilton proceeded to lay down that the main function of a School of Art should be to improve the Arts and Industries of

the country. Nevertheless the information placed before the Conference as regards the recent working of these institutions, tended to show that the principles referred to have been to a great extent overlooked in practice. The conclusions of the Conference on the subject are based, in the opinion of the Government of India, upon thoroughly sound premises. [It is not necessary to refer to them in detail, but I am to request that the system under which the

To the Governments of
Madras, Bombay, Bengal
and Punjab only.

School of Art in.....is managed may be so modified as to bring it into accordance with the general principles which have now been laid down.]

3. The development and organization of Industrial Schools is, however, the matter connected with practical education that appears at the present time to be of the most urgent importance. The conclusions of the Conference are entirely accepted by the Government of India, and it is only necessary to make a few remarks in respect to them. In the first place, I am to say that the Governor General in Council attaches great value to the dissociation of Technical education from ordinary literary education. The Technical or Industrial School should be strictly limited to scientific and technical courses. Every endeavour should be made to secure that students, before entering Industrial Schools, have been properly grounded in the simple forms of education mentioned in the fourth Resolution of the Conference on the subject, but it is recognized that it may not always be possible to secure that the student, when he enters, shall already have received due amount of ordinary education. In order to meet the cases of such pupils, and to secure that they shall not, after leaving an Industrial School, enter the world without any literary education whatever, it may be desirable to arrange for their instruction either in night schools or in special classes. But this education should not be conducted on the Technical or Industrial School itself.

With reference to the general principles formulated by the Conference, I am to refer to the successful establishment and extension of the aluminium industry in Madras by Mr. A. Chatterton, at present Principal of the School of Art in that Presidency. Mr. Chatterton has been able to employ on the manufacture of articles in aluminium 600 men, who were formerly employed in the copper industry. It seems very likely that, but for the development of this particular industry, the articles formerly produced by the workmen now employed on it might have been supplanted in the Indian

market by articles manufactured in other countries. Mr. Chatterton has been successful in his efforts to develop this new industry—a result which the Government of India regard as extremely satisfactory in itself. It seems, however, to them that work of this nature lies outside the scope of the Education Department. The success achieved by Mr. Chatterton has been due to his peculiar qualifications for the work which he has undertaken. Such qualifications are not ordinarily to be expected or desired in an educational officer, and the Government of India wish it to be distinctly understood that commercial enterprises, such as this, must not be undertaken as a part of the scheme of Technical education in India. If any Local Government feels that special efforts are required to organize or to help any particular industry from the mercantile point of view, they should either invoke the assistance of private enterprise, or should arrange for its development by means of special officers not connected with the Education Department.

4. The scheme which the Conference prepared for Industrial Schools, is, in the opinion of the Government of India, practicable and complete. Briefly the principles embodied in their conclusions are that Industrial Schools should be devised to encourage particular local industries or trades; that the best type is the local Trade or Crafts School; that they should be educational and not commercial institutions; that in country districts they should be devoted to the study and development of single indigenous products; that in towns they should deal with manufactures, and that these several industries may there be collected in one building; that only pupils shall be admitted to a school who intend to practise the trade taught there; that the system of paying pupils to attend such schools should be abandoned and fees be levied where this is advisable without injuring the stability and popularity of the school, and that grants-in-aid should be given to assist Craft Schools established by private agency to develop local industries.

5. As a preliminary to the institution of Industrial Schools on these lines, it is necessary that the Local Governments and Administrations should ascertain from the industrial surveys made in accordance with the request made in the Home Department letter No. 14—457, dated the 2nd November 1888, what are the local industries and manufactures which can be utilized and encouraged. It seems desirable therefore that these surveys should be brought up-to-date. In order to make the scheme of Industrial Schools sketched out by the Conference a success, it is essential that the industries to be encouraged should be studied carefully by competent persons capable of instructing teachers who will be able to

impart their knowledge to others. In some instances, such teachers will possibly be available already: in others it may be necessary to import for limited periods men from Europe, who will first of all study the industry *in situ*, and subsequently, at a convenient centre,

To all Local Governments and the Chief Commissioner, Central Provinces.

train the teachers in it. [The Governor General in Council will be glad if the Government of/you will now set about the preparation of a scheme in order to carry out the principles laid down by the Conference. It is his intention to depute a small committee of experts to visit the different Local Government in the forthcoming cold weather, in order to consult them, and to assist them in working out practicable schemes. The Local Government is therefore requested without delay to commence its consideration of the subject, so that a frame-work may be ready for examination with the committee, when the latter visit the head-quarters of the Local Government.] [There appear to be two

To Assam only. Industrial Schools in Assam at present, but possibly there may not be, at all events for the present, much field for the development of such schools on the lines suggested by the Conference.]

6. The examination by the Conference of the subject of Technical education terminated in a resolution recommending the institution of a number of Technical scholarships. State Technical scholarships for the encouragement of the further studies of Indian students in the higher branches of Technical education. This proposal is accepted by the Government of India. The existing State scholarships of £200 a year are given in rotation to students from the different Universities, and are subject to the condition that the holders must proceed to England to study at one of the Universities there. The Government of India propose that the number of Technical State scholarships to be given should be ten a year, two of which should be distributed to the Madras Presidency, two to the Bombay Presidency and two to Bengal, the remaining four being distributed among other Local Governments and Administrations, in whose territories technical instruction has not as yet made the same advance as in Madras, Bombay and Bengal. It is considered that the selection of the students to hold these scholarships should be made by the Local Governments subject to the approval of the Government of India; that the Universities should have no power of nominating to them, and that no candidate should be considered qualified unless he has displayed in his educational career an aptitude for technical study. Subject to these conditions, the Government

of India would propose to leave a wide discretion to the Local Governments in selecting candidates for their approval. The course of instruction and the place at which a scholarship-holder is required to study will have to be strictly laid down by the Local Government in the case of each selected candidate prior to his departure from India. In ordinary circumstances the period for which a scholarship might be held should be two years, but in special cases it might be necessary to extend the term to a third year, and in other cases even to reduce it below two years. In the opinion of the Government of India these scholarships should be tenable in foreign countries as well as in Great Britain. The Government of India are prepared to give to the holder of a Government Technical scholarship £100 a year, as well as to provide him with a second class passage to and from the place at which he will have to study, and to pay the fees at the institution where he is to be sent. I am directed to ask the opinion of the Government of/your opinion as to the details for working out this scheme.

[To Assam only.]

[Probably it will not be necessary, for the present at all events, to bring Assam within the scheme, but I am to ask for your opinion as to this.]

I have the honour to be,

SIR,

Your most obedient Servant,

J. P. HEWETT,

Secretary to the Govt. of India.

[*Home Education A Proceedings, November, 1901, No. 57; Papers relating to Technical Education in India (1886—1904) pp. 249-50, Calcutta (1906).*]

RESOLUTION OF THE SIMLA CONFERENCE (1901) ON TECHNICAL EDUCATION.

Technical instruction, basis for, and Government's sphere of activity in promoting it—existing institutions for higher forms of technical education commended—working of schools of art—existing agricultural institutions organised on theoretical basis, stress on practical work emphasised—weaknesses in existing industrial schools and improvements suggested—institution of state technical scholarships urged—

I. GENERAL PRINCIPLES

THAT Technical Education may be here defined as—

- (a) the study of the scientific methods and principles underlying the practice of any handicraft, industry, or profession;
- (b) the application of those methods and principles to the practice of the handicraft, industry, or profession in question.

The first is the primary or technological aspect of the subject; the second is its subsequent and practical application.

2. That all technical instruction must rest upon the basis of some preliminary education of a simple but practical nature.

3. That this preliminary education is better communicated in existing schools and institutions, *i.e.*, as a department of Primary or Secondary Instruction, than in Technical or Industrial Schools.

4. That it should, as a general rule, include such subjects in the Primary grades as the free hand drawing, simple hand-work, and the elementary principles of natural science.

5. That where it is considered necessary or desirable to give this education to artisans in connection with Technical or Industrial Schools, it should be provided for by special classes attached to them; and that a clear differentiation should be made between (a) literary, and (b) scientific and technical courses.

6. That the functions and activity of the Education Departments, both of the Government of India and of the Local Governments, should be devoted to the promotion of Technical Instruction, rather than to the development of trade; in other words, that a clear line should be drawn between educational effort and commercial enterprise.

7. That the supply or development of the existing Indian markets, in so far as this is likely to result from Technical Instruction, is of superior importance to the creation of new export trades.

8. That in so far as the mercantile aspect of the question calls for separate organization or help, this should be provided for either by private enterprise or by special departments or officers distinct from the existing Educational staff.

II. HIGHER FORMS OF TECHNICAL EDUCATION

9. That Technical Education in India has hitherto been mainly directed to the higher forms of instruction required to train men—

- (a) for the Government Service as engineers, mechanicians, electricians, overseers, surveyors, Land Revenue Officers, and teachers in schools;
- (b) for employment in railway workshops, cotton mills, mines, etc.

10. That the institutions which have been established for these purposes, such as the Engineering Colleges at Rurki, Sibpur and Madras, the College of Science at Poona, the Technical Institute at Bombay, the Engineering School at Jubbulpore, etc., the majority of which are affiliated to Universities, and train up to University courses, have done, and are doing, valuable work, and that their maintenance and further development are matters of first importance; but that the first call upon fresh Technical effort should preferably lie in other directions.

III. SCHOOLS OF ART

11. That the true function of Indian Schools of Art is the encouragement of Indian Art and Art industries; and that in so far as they either fail to promote these arts or industries, or provide a training that is dissociated from their future practice, or are utilized as commercial ventures, they are conducted upon erroneous principles.

12. That the first duty of Indian Schools of Art should be to teach such arts or trades as the pupil intends to practise when he has left the school.

13. That these fall naturally into two classes—

- (a) such arts, as designing in special reference to Indian arts and industries, drawing, painting, illumination, modelling,

photography, engraving, which may be taught either to those who intend to practise them professionally in the future, or to drawing masters in schools;

- (b) such art industries as are capable of being practised in the locality, and in which improvement is capable of being introduced by instruction of the pupils or workmen by means of superior appliances, methods or designs.

14. That the practice of these arts or art industries should be directed to the improvement of the skill and capacity of the pupil or workman, and thereby to their expansion, and should not be pushed to the point of competing with local industries organised upon a caste or trade basis, or of doing within the school what can equally well be done outside, or of usurping the sphere of private enterprise.

15. That samples of the wares produced in Schools of Art may legitimately be kept for sale or for orders, and may profitably be exhibited in public museums, but that it is undesirable to convert the schools into shops, or for Government Educational officers to be responsible for extensive commercial transactions.

16. That it is desirable that a register of the workmen or pupils should be kept on their leaving the Schools of Art, with the object of enabling any orders that may be received to be placed to advantage.

17. That teaching in the Schools of Art should be in the hands of experts trained as a rule in Indian Colleges, or in Art Schools.

18. That the specialisation of a limited number of arts and art industries in the several Schools of Art should be preferred to the simultaneous teaching of a large number.

19. That free admissions and scholarships should, as a general rule, be discouraged, and should gradually be replaced by payment of fees; but that this is compatible with the assistance of necessitous cases, and with the payment of wages to the pupil or workman as soon as his work becomes of value.

IV. AGRICULTURAL COLLEGES AND SCHOOLS

20. That the existing Agricultural Colleges (Madras and Poona) have been organised upon a theoretical rather than a utilitarian basis, leading up to agricultural diplomas or degrees, and have

been directed to the training of Government officials in the Land Revenue and cognate services, rather than to the teaching of practical agriculture to members of the land-owning class.

21. That the interest of both classes may be served by the institution of Agricultural Schools in which practical work is conducted on an experimental farm, *pari passu*, with simple veterinary teaching, and, where required, with instruction in surveying, village accounts and records, Land Revenue law and procedure, and the principles of agricultural science; that there may be two departments in these schools, one conducted in English, and the other in the vernacular, and that the vernacular department may conveniently be utilized for the instruction of village schoolmasters in the elements of agriculture.

22. That it is for consideration whether a School for the practical teaching of agriculture to landholders might be instituted by Government.

V. INDUSTRIAL SCHOOLS

23. That a survey of the existing Industrial Schools in India leads to the conclusion that they have been wanting in definiteness both of methods and objects, that there has been no clear differentiation between general and technical studies in them, that they have depended for initiation and support upon the volition of local bodies rather than upon any sustained policy of Local Governments, that they have been insufficiently co-ordinated with particular local industries or trades, and that the impression produced by them either upon industrial development, or upon industrial educations, has been relatively small.

24. That the instruction given in such schools should be technical in preference to general, specialised instead of diffuse.

25. That the form of Industrial School recommended by the Conference for future adoption where practicable, or for encouragement by grants-in-aid where it already exists, is a Local Trade or Crafts School, directed to the furtherance or development of a local industry, which appears to be capable of expansion by the application of superior methods or implements.

26. That such schools may be either country or urban, according as the industry in question is practised in the country or in towns.

27. That in country districts such schools will best be devoted to the study and development of single indigenous products: in towns to the development of manufactures; and that in towns it may be possible to collect several industries in a single building, and to give instruction in diverse branches of industry or manufacture.

28. That such schools, whether country or urban, should be primarily educational, and not commercial institutions; that they should be, as far as possible, self-supporting, but should not compete with established private trades.

29. That only such pupils shall be admitted as will proceed to practise the industry taught.

30. That the levy of fees is a proper feature of Industrial schools, but that it is dependent upon the position and means of the pupil and the stability and popularity of the institution, and cannot everywhere be enforced in the early stages.

31. That it will be a necessary preliminary to the institution of such schools to ascertain what are the industries or manufactures to which they may be applied, in the light of the Industrial Surveys already made.

32. That, where it is considered possible to open new or extended markets for the produce of the industry or manufacture thus developed, it will probably be found desirable to connect them with Commercial Museums, both in and outside of India.

33. That for the present the best available teachers, overseers, and foremen for these schools should be procured either in India or from abroad; but that in time it is hoped that they may be produced in larger numbers by institutions at suitable centres in India, where the investigations of products and industries can be carried on.

34. That in provinces where the suggested developments admit of wide or rapid growth, it should be for the consideration of the Local Governments whether a separate Technological Department of Government may in time be instituted, for their especial supervision and control.

VI. STATE SCHOLARSHIPS

35. That it is desirable that the Government of India should institute a number of State technical scholarships, perhaps ten in

number, with an approximate allowance of £100 a year, in addition to travelling expenses and fees, to be awarded annually in fixed proportions by the Local Governments, subject to the sanction of the Government of India, to selected candidates, who should be sent abroad to undertake definite courses of study in subjects connected with industrial science or research. That these scholarships might be held for an average duration of two years.

[*Home Education A Proceedings*, November 1901, No. 57; *Papers relating to Technical Education in India* (1886—1904), pp. 251—53, Calcutta (1906).]

TECHNICAL SCHOLARSHIPS (Document No. 1)

Government of India seek Secretary of State's approval on scheme regarding institution of State scholarships for Indians desiring to pursue technical studies in U.K. and other European countries.

FROM—The Government of India, Home Department.

TO—The Right Hon'ble LORD GEORGE FRANCIS HAMILTON,
His Majesty's Secretary of State for India.

We have the honour to advert to Your Lordship's Despatch No. 105—Public (Educational) dated the 2nd August 1901, with which you forwarded a question asked in the House of Commons by Sir M. M. Bhownaggee and the answer given thereto on the subject of founding additional Government scholarships for natives of India who might desire to pursue technical studies in Great Britain or other countries of Europe.

Your Lordship at the same time expressed a wish to be informed of the result of our deliberations in the matter.

2. The question of the institution of State technical scholarships formed one of the subjects which came up for discussion before the Educational Conference held at Simla in September 1901, and the following resolution was then passed:—

“That it is desirable that the Government of India should institute a number of State technical scholarships, perhaps ten in number, with an approximate allowance of £100 a year, in addition to travelling expenses and fees, to be awarded annually in fixed proportions by the Local Governments, subject to the sanction of the Government of India, to selected candidates, who should be sent abroad to undertake definite courses of study in subjects connected with industrial science or research. That these scholarships might be held for an average duration of two years.”

3. In our letter* addressed to Local Governments and Administrations on the 20th November, 1901, relating to the subject of practical and technical education, we informed them that the Government of India accepted the recommendation of the Conference as to the institution of ten State technical scholarships, and that they proposed to give

*Extract enclosed.

two of them to the Madras Presidency, two to the Bombay Presidency, and two to Bengal, and to distribute the remaining four among the other provinces, where technical instruction had not yet advanced so far as in the three provinces mentioned. It was suggested that the selection of the students to hold these scholarships should be made by the Local Governments subject to the approval of the Government of India; that the Universities should have no power of nominating to them; and that no candidate should be considered qualified unless he had displayed in his educational career an aptitude for technical study. Subject to these conditions, it was considered that a wide discretion should be left to the Local Governments in selecting candidates for the award of these scholarships. We stated our opinion that in ordinary circumstances the period for which the scholarships might be held should be two years; but that in special cases it might be increased to a third year or even reduced below two years; and that the scholarships should be tenable in foreign countries as well as in Great Britain. The Local Governments and Administrations were asked to submit their views as to the details for working out the scheme.

4. The replies of the Local Governments and Administrations to our communication have received careful consideration at our hands, and we have now the honour to enclose a copy of them for Your Lordship's information. It will be seen that the outlines of the scheme sketched out by us have been generally accepted, but that there is a divergence of views in connection with the details. The scholarships are to be given for the purpose of providing for natives of India the higher technical education which may qualify them to assist in promoting the improvement of existing native industries and the development of new industries, wherever this may be possible: Technical education for this purpose may be defined as (a) the study of the scientific methods and principles underlying the practice of any handicraft, industry, or profession, (b) the application of these methods and principles to the practice of the handicraft, industry, or profession in question. Law, Medicine, Forestry and Veterinary science being already provided for, are not included among the subjects to be studied by the holders of these technical scholarships, and Agriculture does not fall within the scope of the present scheme. The scholarships will be awarded by the Government of India upon the recommendation of the Local Governments, and will for the present, as already stated, be distributed as follows:—Two annually to the Madras Presidency, two to the Bombay Presidency; two to Bengal, and the remaining four among other Local Governments and Administrations.

5. We do not propose to prescribe the particular industries for the encouragement of which particular provinces should give scholarships. The Local Government or Administration which is asked to recommend a candidate will consider what industries are of importance in the province, and which of them may best be encouraged by scholarships, taking care to connect the scholarship scheme with the system of technical and industrial education in the province. In determining the choice of an industry Local Governments should, in our opinion, obtain assistance from the mercantile and industrial public, and take all measures that appear to them to be possible and expedient for interesting the influential sections of that public in the scheme. Industries in which native capital and enterprise are engaged, or likely to be engaged, will be particularly appropriate for selection. It should be borne in mind that men who have received an expensive European training can be employed only upon such industries as are susceptible of being organized upon a considerable scale.

6. In each case in which a Local Government recommends a scholarship, it will be necessary for it to support its selection by giving the Government of India some account of the state of the particular industry which it is intended to promote and some comparison with other industries which might be considered eligible for encouragement. In determining the industry to be studied and choosing the man recommended for the scholarship, the Local Governments and Administrations will be required to bear in mind the importance of ensuring that the returned scholar shall find scope for his skill and ability. It has been proposed on the one hand that such scholars before they are appointed should be placed under engagement to serve Government on their return. On the other hand, it has been suggested that private firms should be asked to guarantee their employment, and that the scholars should be reciprocally bound by engagement to such firms. We consider that the holder of one of these scholarships should not be bound by any such engagements, but that the prospect of his chances of employment after the completion of his studies should be well weighed when he is selected, and that upon his return the choice of his career should be in the first instance determined by his own inclination. If the early results of the scheme are successful, we think that the services of the returned scholars are sure to be in good demand, and that, failing private employment, Government will be glad to turn their abilities to account as teachers in industrial schools or in other capacities connected with the improvement of local industries.

7. It is our intention to make it a condition of the grant of these scholarships that no candidate is to be selected for recommendation

to one of them on the result of competitive examination either open or limited. It is desirable that, in selecting the industry to which they are to be directed, Local Governments should give the widest possible publicity, through such channels as they think fit, to their intention to nominate scholars, and that they should take such advice as they need from persons cognizant of the industry and from officers and others connected with technical education. In making the selection they should bear in mind the fact that it will be necessary for the student to have a competent knowledge of English, or of the language of any other country to which he is to be sent; and they should also be guided by considerations of his capacity, intelligence, practical interest in the industry, and the assurance which they feel that he will continue to devote himself to it on his return to India. These are matters which cannot be decided by competition; and we intend that it should be made clear from the beginning that these scholarships are not to be regarded as prizes, for which everyone has a right to claim an equal opportunity of competing. It is not necessary to lay down more precise rules as to the kind of general education which the scholar is to have received. Governments will act on their own discretion, having regard to the above considerations. As a general rule a scholar before being nominated should have received the best technical education available in the province in the particular industry which he has to study. The standard of this education differs in different industries, and each may be considered on its own merits. Even if the standard of technical education in a particular industry in a province is low, the scholar may be nominated if he has availed himself of the best facilities obtainable, and shows an interest in the industry. No age limit will be laid down for scholars and none should be generally laid down by the Governments; but an age limit may at the discretion of a Local Government be fixed for any particular scholarship for which they invite applications. The particular industry to be studied will, as is stated above, be specified by the Local Governments in nominating a scholar, but they will hardly be in a position to define minutely the course of study to be pursued nor will they ordinarily be in possession of the most recent information as to the facilities for such studies existing in England and elsewhere. We are inclined to think therefore that the best plan will be to leave these matters to be settled by Your Lordship when the scholar arrives in England; and if this view is accepted we will arrange that timely information shall be submitted to you as to the probable date of each scholar's arrival and the subject which he is required to study. We propose that those scholars who study in England should be under Your Lordship's control and we trust that

in the case of those who elect to pursue their studies on the Continent or in America Your Lordship may be able to make suitable arrangements for their supervision. The conditions under which they will hold their scholarships will be similar to those laid down for Government of India scholarships. Progress reports will be required upon them from time to time, and power will be retained to cancel a scholarship and to send the scholar back to India if his progress is not satisfactory.

8. Should the principles which we have advocated in connection with the institution of these technical scholarships meet with Your Lordship's acceptance, we trust the scheme for the establishment of ten scholarships of £100 a year may receive Your Lordship's early sanction.

[Despatch to the Secretary of State, Dated 9th October, 1902, No. 8; Papers relating to Technical Education in India (1886—1904), pp. 253-54, Calcutta, (1906).]

8-A

TECHNICAL SCHOLARSHIPS (Document No. 2)

Secretary of State seeks further clarification on the scheme regarding proposed technical scholarships for Indians in U.K. and other European countries.

FROM—The Right Honourable LORD GEORGE FRANCIS HAMILTON, His Majesty's Secretary of State for India,

TO—His Excellency the Right Honourable the Governor-General of India in Council.

On receipt of the letter of Your Excellency in Council No. 8 (Education), dated the 9th October last, in which you proposed the establishment of ten State technical scholarships, to be awarded annually to natives of India studying in Great Britain or other Western countries, I thought it desirable to obtain the opinion on the scheme of the Board of Education.

Proposed Technical Scholarships for Natives of India studying in Great Britain or other Western Countries.

2. I enclose a copy of the letter addressed to the Board, and of their reply thereto.

3. It is not necessary for me to assure Your Excellency that the principle of the scheme, which applies to India a system which has, I understand, proved very successful in the case of Japan, and more recently in that of Siam, meets with my full approval, and that I cordially sympathise with the desire of your Government to further the development of Indian industries by providing promising young men with the means of studying the progress which has been made in industries and arts in the most advanced countries of the West. It appears to me, however, that before the details of the scheme can be finally settled there are some points which call for further examination.

4. Your Excellency will observe that the Board of Education express a doubt, which I share, whether a scholarship of 100 *l.* a year, in addition to fees and travelling expenses, will fully meet the expenses of a student in this country. I observe that in 1887, when dealing with the existing Government scholarships of 200 *l.* a year, the Government of India found it necessary to issue a public warning that "while the scholarship allowance of 200 *l.* a year is sufficient to cover the necessary expenses of college life at Oxford or

Cambridge, it is very desirable, if not absolutely necessary, that the scholars should have some small private resources of their own to meet expenses in the vacation and other general expenses which are scarcely avoidable." And it appears to me that the holders of the proposed technical scholarships will be in the same case. I would therefore ask you to consider whether it is not necessary to fix some higher limit to the scholarship allowance.

5. I observe from your fifth paragraph that it is proposed to connect the scholarship scheme with the system of technical and industrial education in the various provinces, which will no doubt be established as the result of your deliberations on the report of the Industrial Schools Committee. I do not gather from the replies of the various Local Governments which you forward that there is any large supply of qualified candidates for the scholarships as yet forthcoming, at any rate in the two provinces which are believed to be industrially most advanced—Bombay and Bengal, and I should suppose that it would take some time to bring into existence a class of students trained in properly equipped technical schools in India, who would be ready to take up the scholarships when established. Before, therefore, sanctioning any definite annual number of scholarships to be awarded, I think it would suffice to announce the readiness of Government to give a scholarship or scholarships if promising and well-qualified candidates present themselves in some particular branch of industry. In other words, it appears to me that the scheme should for the present be worked experimentally, its further development being left for consideration when your technical institutions in India have begun to produce a class of students who might be expected to profit by its extension.

6. I notice that you exclude from the scope of the scheme Law, Medicine, Forestry and Veterinary Science, as being already provided for; and certainly there is no lack of Indian students who, without the inducement of a scholarship, visit this country in order to study the first two of these subjects. Engineering is not mentioned among the excluded subjects; you are, however, aware that Indian candidates present themselves in considerable numbers for entry to the Coopers Hill College, while the Engineering Colleges in India are, I presume, capable of giving instruction of a high class in that subject.

7. I shall be ready, with the advice of the Board of Education, to undertake the selection of the course of technological study best fitted to the needs of any particular scholar. Your Excellency will observe that the Board, in the concluding paragraph of their

letter, ask that they may, in any case in which their advice is desired, be furnished with full particulars as to the past educational experience and future requirements of each scholarship-holder. Should any student elect to pursue his studies on the Continent or in America, it would probably be found possible to obtain from the head of the institution where he is studying a periodical report on his progress and conduct; but no more extended supervision by this Office would in such a case be practicable, and I should hope that the persons selected for the scholarships would ordinarily be of such formed character and habits, and of such an age, that detailed tutelage would in their case be unnecessary.

Enclosure No. 1

*Secretary of State invites opinion from Secretary, Board of Education,
on the scheme regarding technical scholarships for Indians.*

No. J. and P. 2392-02, dated the 25th February, 1903.

FROM—Sir HORACE WALPOLE, K.C.S.I., C.I.E., Under-Secretary of State for India,
TO—The Secretary, Board of Education, London.

I am directed by Lord George Hamilton to enclose, for the information of the Board of Education, a copy of a despatch* which has been received from the Government of India, proposing the establishment of ten scholarships annually for natives of India who may desire to pursue technical studies in Great Britain or other European countries.

*No. 8, dated the 9th October 1902, with enclosures.

It will be seen that the Government of India, while contemplating that the particular industry to be studied by a scholarship-holder shall be determined in India by the Local Government before he is nominated, propose to leave to this Office the prescription of a course of study, with reference to the facilities for such studies existing in England and elsewhere. They propose also that special arrangements should be made for the supervision of any students who may elect to pursue their studies on the Continent or in America. The value of the scholarships is fixed at 100 £. a year, in addition to the fees payable to the institution where the scholars will study, and travelling expenses.

Lord George Hamilton would be much obliged if the Board of Education would favour him with their advice on the proposed scheme, and, in particular, in regard to those points in it which are enumerated in the preceding paragraph. There is not at present in this Department any official who could be made responsible for selecting a course of study for an Indian holding a technical scholarship, and His Lordship hopes that if the scheme is brought into operation he may count on the assistance of the Board of Education specially in this respect.

It is understood that the system of deputing students to Europe for technical study has been adopted with much success by the Government of Japan and more recently by that of Siam; and

it is probable that the experience gained in these cases (if known to the Board of Education) would afford some criterion of the results which may be expected from the establishment of a similar scheme for natives of India.

Lord George Hamilton would be glad to learn whether, in the opinion of the Board, an allowance of 100 *l.* annually (in addition to fees and travelling expenses) is likely to suffice for the support of an Indian in this country while undergoing a course of study.

Enclosure No. 2

Comments by Board of Education on the scheme regarding technical scholarships for Indians.

Dated the 21st April, 1903

FROM—Mr. ROBERT L. MORANT, C.B., Secretary, Board of Education, London.
TO—The Under Secretary of State for India.

In reply to Sir H. Walpole's letter of February 25th, I am directed by the Board of Education to state that they regard the proposed establishment of ten annual travelling scholarships for natives of India who shall pursue technological studies in Great Britain or some other Western country as likely to prove of benefit to Indian Industry and Education.

The Board note that the Government of India in their Despatch of October, 1902 contemplate cases in which the scholar will elect to pursue his studies in America, while in your letter of 25th February last the sphere of study is limited to Great Britain or other European countries. If this discrepancy is due to inadvertence, the Board would take this opportunity of saying that in their opinion some of the scholars might derive special advantage from a course of study in America supplementing a period of residence in Europe.

If requested by the Secretary of State for India, the Board of Education, though unable to undertake responsibility for the personal supervision of the students, will be happy to give such advice as is within their competence, from time to time as to the course of technological study best fitted to the needs of any particular scholar.

In reply to the question of the Secretary of State as to the sufficiency of the proposed annual allowance, the Board are of opinion that 100 l. annually (in addition to fees and travelling expenses) would not be adequate to the student's needs, and they believe that this view is confirmed by the experience of those who have organised similar scholarship systems for the Governments of Japan and Siam, but, of course, much would depend on the social status of the scholars and on the country to which they were sent.

In this connection the Board of Education would be glad to receive more precise information as to the exact educational standing of the proposed scholarship-holders. The Board are at present not clear whether it is contemplated that these scholars should pursue technical studies of the highest grade, or of an intermediate character, or whether they might even be of artizan rank; but it is presumed that the reference is to the needs of the first two classes. In any case in which the Board might be called upon to advise with regard to any student they would desire to be furnished with a statement of his past educational experience and future requirements.

[*Despatch from the Secretary of State, dated 29th May, 1903, No. 65 (Public); Papers relating to Technical Education in India, (1886—1904), pp. 254—56, Calcutta (1906).*]

8-B

TECHNICAL SCHOLARSHIPS (Document No. 2)

Government of India intimate Local Governments changes in the scheme regarding technical scholarships in view of suggestions from Secretary of State.

Nos. 565—572, dated the 21st September 1903.

FROM—W. S. MARRIS, Esq., Under Secretary to the Government of India, Home Department,

To—Local Governments and Administrations.

I am directed to forward for the information of the Governor in Council/His Honour the Lieutenant-Governor/your information, a copy of the papers noted on the margin, regarding the institution of State technical scholarships to enable natives of India to pursue a course of study in Great Britain or other Western countries.

Despatch to the Secretary of State, No. 8, dated the 9th October, 1902.

Despatch from the Secretary of State, No. 65, dated the 29th May, 1903, and enclosure.

2. In view of the doubts expressed by the Board of Education and the Secretary of State as to the sufficiency of the proposed amount of the scholarships, the Government of India think that it would be well to fix their value at £150 a year. As has been pointed out, however, the question depends largely upon the status of the scholar, and on the country to which he proceeds for study: and if in any particular case the Local Government regards the sum now named as insufficient the Governor General in Council will be prepared to consider proposals for increasing it.

3. Instead of announcing the intention to award a definite number of scholarships annually, the Government of India agree with the Secretary of State that it will for the present suffice to intimate the readiness of Government to give a scholarship or scholarships if promising and well-qualified candidates present themselves in some particular branch of industry. They further accept His Lordship's suggestion that Engineering should be excluded from the scope of the proposals.

4. Subject to the foregoing modifications, the Despatch of 9th October 1902, to the Secretary of State indicates the conditions under which the Government of India desire to introduce experimentally a scheme of technical scholarships. The information now before

them suggests that the textile industry in Bombay and the mining industry in Bengal will be found to offer the most favourable fields for the initiation of the experiment.

The Government of India will, however, be glad to consider any suggestions which the Government of you may have to offer for the establishment of a technical scholarship in any other branch of industry which can thereby be developed, if a 'suitable candidate can be found.'

[*Papers relating to Technical Education in India* (1886—1904) pp. 256-57, Calcutta. (1906).]

RESOLUTION OF THE GOVERNMENT OF INDIA ON THE REPORT OF THE COMMITTEE ON INDUSTRIAL SCHOOLS IN INDIA

Report of the Committee on industrial schools reviewed—abolition of industrial schools and substitution for them of a system of supervision of workshops suggested—Government of India's disagreement with the findings—scheme for industrial instruction suggested.

In the course of a general review of the subject of technical education the Government of India arrived at the conclusion that industrial schools in India have been wanting, in definiteness both of methods and objects, that there has been in them, no clear differentiation between general and technical studies, that they have depended for support upon the casual efforts of local bodies rather than upon any sustained policy on the part of the Provincial Governments, that they have been insufficiently co-ordinated with particular local industries or trades, and that the impression produced by them either upon industrial development or upon industrial education, has been relatively small.

2. In order to bring these views to the test, the Government of India decided in December 1901 to appoint a

*Colonel J. Clibborn, I.A., C.I.E., *President*,
Mr. C.A. Radice, I.C.S.,
Mr. R. E. Enthoven, I.C.S.,
Rev. Foss Westcott, M.A.—*Members*.
Committee* to visit the different provinces in connection with the institution of industrial schools, to examine into what had already been done, and with what measure of success, and to confor with local educational officers and others as to the best means of establishing such schools. The Committee were instructed that the views which the Government of India were inclined to hold upon the subject were as follows :—

- (a) That the instruction given in such schools should be technical in preference to general specialised instead of diffuse.
- (b) That the most useful form of industrial school is a local trade or crafts school, directed to the furtherance or development of a local industry, which appears to be capable of expansion by the application of superior methods or implements.
- (c) That such schools may be either rural or urban, according as the industry in question is practised in the country or in towns.

- (d) That in country districts such schools will best be devoted to the study and development of single indigenous products; in towns to the development of manufactures: and that in towns it may be possible to collect several industries in a single building and to give instruction in diverse branches of industry or manufacture.
- (e) That such schools, whether country or urban, should be primarily educational, and not commercial institutions; that they should be, as far as possible, self-supporting, but should not compete with established private trades.
- (f) That only such pupils should be admitted as will proceed to practise the industry taught.
- (g) That the levy of fees is a proper feature of industrial schools, but that it must be dependent upon the position and means of the pupil and the stability and popularity of the institution, and cannot everywhere be enforced in the early stages.
- (h) That it will be a necessary preliminary to the institution of such schools to ascertain what are the industries or manufactures to which they may be applied, in the light of the industrial surveys already made.
- (i) That, where it is considered possible to open new or extended markets for the produce of the industry or manufacture thus developed, it will probably be found desirable to connect them with commercial museums, both in and outside of India.
- (j) That for the present the best available teachers, overseers, and foremen for these schools should be procured either in India or from abroad; but that in time it is hoped that they may be produced in larger numbers by institutions at suitable centres in India, where the investigations of products and industries can be carried on.
- (k) That in provinces where the suggested developments admit of wide or rapid growth, it should be for the consideration of the Local Governments whether a separate Technological Department of Government may in time be instituted, for their special supervision and control.

3. The recommendations of the Committee will be found summarised at the beginning of their Report*. Many of these recommendations travel far beyond the terms of their instructions, and deal with matters bearing upon general industrial development and research, the regulation of factories, and other miscellaneous questions into the discussion of which the Government of India do not now propose to enter. Upon the subject of industrial education, the Committee have not submitted definite proposals for carrying out the principles commended to them, and applying them to particular schools. They state in the last paragraph of the Report, Part I, that in the absence of a complete survey of industries they have found it impossible to make detailed recommendations as to particular industries and the methods of instruction that may with advantage be applied to each. But they have put forward a series of proposals which, instead of applying the principles set forth above, suggest the creation of a new system resting upon an entirely different basis.

4. The central recommendation of the Committee is that industrial instruction in India should be organised upon the model of the Casanova boy artisan school at Naples. This institution aims at giving the boys belonging to the poorer classes of a notoriously vicious population such mental, moral, and manual training as will turn them into good citizens, honest men, and skilful artisans. It is a day school at which attendance is enforced for long hours throughout the year, including Sundays and holidays, in order to withdraw the boys as much as possible from evil home influences. The course is one of 7 or 8 years from the age of 8 to 15, the hours of weekly attendance ranging from $31\frac{3}{4}$ to 67. For the first three years the boys receive elementary instruction, including drawing and modelling, and at the age of eleven they enter one of the workshops attached to the school. From that time forward they spend their time partly in the workshops—for from $34\frac{1}{2}$ to 39 hours a week—and partly in school. The workshops are attached to the school, and are occupied by master artisans who are permitted to occupy them rent-free upon undertaking to conduct their trade there, to employ none but boys of the school as apprentices, and to be in all matters obedient to the principal of the school. The master artisans work upon their own account for the market, and the school is not financially interested in their transactions. Fourteen master artisans are thus concentrated within the school building, who follow fourteen trades varying from bronze-founding

*Copies of the Report have been circulated to Local Governments and a limited number are available for purchase with Superintendent, Government Printing, Calcutta.

to watch-making. The workshops are patrolled by the school teachers, whose duty it is said to be to see that the boys are taught in the best possible way and that strict discipline is maintained. Besides working in the workshops, the boys learn drawing and modelling in the school, and also receive other instruction compendiously described as desk-work, of which no particulars are given. As soon as their work begins to be of value in the workshops, the boys receive wages, and upon leaving school they have no difficulty in obtaining well-paid work as artisans. The cost of the teaching of each boy is stated to be Rs. 80 per annum.

5. The views of the Committee as to the adaptation of this system to India are contained in their Recommendations, Nos. 5, 16 to 31, and 41 to 47, which precede the report. It is proposed that in the first instance selected factories, workshops, and craftsmen's shops should be registered for the training of apprentices under Government supervision, and that eventually the craftsmen should be induced to gather together under one roof or in one group of adjoining workshops. The inducement offered to them to do so would be monetary rewards loans, expert advice free of charge, and the other advantages detailed in paragraph 26 of the report. The monetary rewards to the master craftsmen for the progress of the apprentices would take the shape of a system payment by the result of examinations. The apprentices would be housed in hostels and would receive rewards and certificates on the results of the test examinations, and would be given facilities for being indentured to large factories. So far the proposals do not provide for giving the apprentices any school instruction. The Committee (paragraph 11) regard the "class system" as generally inefficient, costly, and unsuited to institutions supported out of public funds, but they propose (paragraph 44) that opportunities should be given for the apprentices, as well as for working artisans, to attend voluntarily at classes held at night schools out of working hours. Existing industrial schools should the Committee think, either be converted into supervised workshops working for a profit, and supplemented by night classes for other instruction, or else classified, not as industrial schools, but as schools of general instruction in which manual training forms part of the curriculum.

6. The scheme thus sketched by the Committee is one which has for its end the abolition of the industrial schools and the substitution for them of a system of supervision of workshops. The arguments drawn from the existing defects of Indian industrial schools (stated in Chapter I) which have led the Committee to the conclusion that the class system is inefficient and unsuitable, appear

to the Government of India to be unconvincing. In support of the proposition that industrial education should not be imparted in industrial schools an appeal is made (paragraph 15) to the practice of other countries. The educational conditions of India are so different from those of European countries that the argument from foreign precedents must in any case be received with caution. But the Government of India believe that in fact foreign educational methods show no tendency to substitute teaching by apprenticeship for teaching in schools; but that, on the contrary, industrial schools have been, and are being, called into existence in order to supply the defects of the apprentice system, which not only fails to give proper technical instruction, but also in many cases cannot even provide economically for the complete training of the apprentices in manual dexterity. Paragraph 11 of the report claims that the proposal to substitute the apprentice system for industrial schools in India is supported by the general opinion of the authorities consulted. The Government of India are unable to agree in this conclusion: it appears to them that the proposal is contrary to the weight of the evidence recorded in Part II of the Report. Reference to the joint report of Mr. Giles, Dr. Thomason, and Mr. Burns (page 113), and to the opinions expressed by Mr. Giles (page 118)—Dr. Thomson (pages 121 and 123), Mr. Burns (pages 126 and 127), Mr. Chatterton (pages 166-167), Mr. Bell (page 47), Mr. Lewis (page 26), and Mr. Sly (page 83), and also to the scheme put forward by Mr. Pedler (pages 21-23), shows that none of these authorities can be quoted as favouring the substitution of the apprentice system for the system of industrial schools.

Mention is made (paragraph 7) of an attempt to conduct the Lucknow Industrial School in accordance with the scheme recommended by the Committee. That experiment has now been tried and has proved a complete failure; and it has been found necessary to abandon the experiment and to reconstruct the school. The Government of India are therefore unable to find in the arguments advanced by the Committee, in the example of other countries, in the opinions of the expert witness, or in practical experience in India, any reasons which would justify them in sweeping away the present industrial schools and substituting the system described in this Report.

7. The proposals of the Committee appear, moreover, to the Government of India to be open to certain serious objections—

(i) The principles accepted by the Government of India in respect of technical education are that all such education should rest upon the basis of some preliminary education of a simple but practical nature, that this preliminary education is better communicated

as a part of ordinary primary education than in industrial schools, and that the instruction given in industrial schools should be technical rather than general. But in the school recommended by the Committee for imitation, there is no such separation. Both general and technical education are given in the same institution and under the same supervision.

(ii) It appears to the Government of India that the value of instruction in the principles underlying processes upon which industries depend is insufficiently appreciated by the Committee. In their report, all teaching, other than actual workshop practice, is relegated to a subordinate place, and is to be given voluntarily in night schools. And so little importance do the Committee attach to the matter, that they have indicated only in the merest outline the manner in which such schools should be conducted or the courses of study which they should offer. Judging from previous experience, however, the Governor-General in Council has little expectation that youths who spend the entire working-day in workshops will voluntarily attend a night school with any regularity, and he has no doubt whatever that systematic instruction in principles is essential to the success of any system in industrial training.

(iii) When they come to discuss the practical instruction to be imparted to pupils, the Committee dwell with emphasis upon the marketable value of the work to be done. In the judgment of the Government of India, this position is based upon a failure to distinguish sufficiently between a school and a commercial undertaking. In communicating their views to the Committee the Government of India expressed their conviction that industrial schools should be primarily educational, and not commercial, enterprises. The Committee, on the other hand (Recommendation No. 43), maintain that such institutions should aim at financial profit. The Government of India agree with the Committee in thinking that industrial schools as at present conducted frequently fail to train their pupils up to the standard of manual skill required for the market, and pursue unpractical methods. It is most wholesome, therefore, that they should be brought to the test of producing saleable articles. But this is a very different thing from requiring progressive and methodical industrial training to be sacrificed to the necessity of showing a profit on the work done by the boys, and in so far as the two objects are incompatible with one another the Government of India desire to give precedence to the former.

(iv) Finally, it appears to the Government of India, as also to several of the witnesses examined by the Committee, extremely improbable that in India artisans could be concentrated round a

school in the manner proposed, and subjected to control of the kind contemplated by the Committee. Here and there under very special conditions such an experiment might succeed; but it cannot be regarded as offering a solution of the general problem of industrial education.

8. While they have felt bound to point out the defects in the Report, the Government of India desire at the same time to acknowledge the useful work that the Committee have done. They have collected information, which was nowhere else available, as to the number of the existing industrial schools, with particulars of the trades taught, the qualifications of the teachers, the numbers of the pupils, and the cost of the undertakings. Their Report gives a valuable account of the conditions of certain trades, and of the prospects of their development, with suggestions as to the points to which inquiry should be directed. The native system of apprenticeship and the working of trade guilds are explained and illustrated in an interesting and suggestive manner. They have emphasised the important principle that the object and justification of the schools must be to impart skill in a specialised manner, and to aim at improving a trade, and not merely at perpetuating existing routine methods. And they rightly point out that these objects can be attained only by the employment of skilled teachers, and of well-qualified inspectors having a practical acquaintance with the processes that are taught.

9. As matters now stand, two entirely different sets of principles have been put forward, and nothing has been done to bring either of them to the test of practice. In commending the question to the attention of Local Governments, the Government of India have no desire to restrict them unduly in their choice of methods. They endorse the opinions expressed by several witnesses that it is impracticable to build up rapidly a great fabric of technical education in India at the present time. The matter has not yet passed the stage at which many experiments must be tried, and a proportion of failures must be expected. At the same time, there are certain broad principles which they think should govern the action to be taken.

10. For practical purposes it is most necessary to distinguish between the kind of institutions which will be suitable in great industrial centres, such as Bombay, Howrah, or Cawnpore, where capital is employed in the organization of industries on a large scale, and those suitable for towns in which the local industries are practised as handicrafts in small private establishments. In the

former case action may proceed on bolder and more advanced lines than in the latter; for where there are organization and capital, there must also be intelligence sufficient to appreciate the value of properly trained workers. In such places the employers are already convinced, a demand exists which it is the object of Government to supply, and the bonds of caste and trade guilds are generally speaking less strict than elsewhere. But even in those cases it will still be necessary to convince the employes of the value of the training which industrial schools offer. It is of the first importance therefore to enlist the active co-operation of employers of labour in the scheme, for if the employes see that employers attach importance to the training which it offers, they will be far more ready to believe in its value. Moreover, there are signs that an era is approaching of a considerable expansion in the industrial employment of native capital; and this prospect may justly be taken into account as offering a probable opening for more highly trained men. In such centres of industry as those which have been named, it seems to the Government of India that it should be possible to set up whole-time schools to which pupils will be admitted after reaching as high a standard of general education as can be exacted. The school would be fitted with the plant appropriate to some one trade, and the pupils would receive a course of instruction fairly divided between actual workshop practice and the study of the principles and scientific processes on which the trade depends. An instance of such a school is provided by the Victoria Jubilee Technical Institute in Bombay. Numerous examples are to be found in other countries; and where Indian come into competition with foreign manufactures, the object should be, as far as possible, to produce an Indian workman as well trained as his foreign competitor. The technical scholarships which Government have instituted, and regarding which Local Governments have been separately addressed, will be of great importance in developing such schools, and in enabling the Indian student to study foreign examples of technical training and to adapt them to Indian conditions. In the first instance, however, it will probably be necessary to offer scholarships to the pupils in such schools until the commercial value of the training has been established.

11. In the case of local handicrafts, the problem is at once more important and more difficult. It is more important, because it is only through the small industries that any real impression can be made upon the industrial classes of India. It is more difficult, because in this case the employers no less than the employes require to be convinced of the value of systematic training as the basis for manual skill. The trades are ordinarily in the hands of

guilds constituted on a caste basis; and, in order to succeed, the system of instruction must secure their co-operation. The age at which children begin to work in India is very young, and it is not to be expected that parents of the artisan class will agree to keep their children unremuneratively occupied until they have first secured a good grounding in general education and have then passed through a course of industrial instruction. These considerations were doubtless present to the minds of Colonel Clibborn's Committee, and may have led them to their conclusion in favour of supervised workshops. But it is not possible for the State to undertake anything approaching to universal industrial education administered by artisans in private workshops under State inspection. Effort must be confined to producing artisans who will rise to a distinctly higher standard both of general intelligence and of manual skill than can be obtained by the ordinary traditional routine. The supply of pupils for such instruction implies some self-sacrifice on the part of parents, and this must be met by scholarships which will suffice for the maintenance of the pupils while they are being trained.

12. It remains to examine the lines on which a practical beginning should be made. It appears to the Government of India that the two important objects (1) of keeping up and developing a boy's inherited manual skill, and (2) of giving him a general education which will enlarge his prospects as a craftsman while preventing him from falling into the clerical groove—might be attained by starting in selected places half-time industrial primary and higher primary schools, the course of studies in which should be designed with special reference to teaching that accuracy of workmanship in which Indian artisans are conspicuously deficient, and to familiarising the pupils with the best designs and processes as applied to their hereditary trade. Geometrical drawing and designing would therefore form an essential part of the course, and the general education given would be determined with reference to the trade. The boys would spend half the day at the primary school, and the other half in working as registered and supervised apprentices under approved artisans, who would receive a monetary reward for each apprentice on the conditions, (1) that they taught them the trade thoroughly and not merely the elementary processes, (2) that they accepted supervision and control by a Government expert.

13. If such a scheme be attempted, there are certain conditions which should be strictly enforced. In the first place admission should be strictly limited to pupils whose caste occupation is the industry

which the school is intended to develop. The obligation to work in the workshop would probably effect this automatically. Secondly, the education given in the primary school should be so ordered as not to fit the pupil for clerical employment. No English should be taught, and the reading should be limited to the vernacular. Thirdly, as mentioned above, scholarships for all the pupils should be provided, at any rate for some time to come, and this condition alone will greatly limit the scope of possible effort. Further, if any progress is to be made with such a scheme, an inspector will be required who knows more than the teachers whose work he is to inspect, including the teachers in the workshop.

14. The appointment of such an inspector presents great difficulty. The statement of his qualifications implies that he could only efficiently supervise one industry. A single province will not at first find sufficient employment for such an officer, and the diversity of languages will be a great obstacle to his employment in more than one. The Government of India have sought the advice of Local Governments and Administrations as to how this difficulty may best be overcome. It may be that the experiment should at first be confined to a single industry; and, if so, it would probably be well to give the preference to weaving. The Government of India are inclined to think that, if one or more expert inspectors of this industry can be found qualified to promote such a system of teaching, they should be provincial officers attached to one or more provinces rather than imperial officers.

15. Such a scheme as has been sketched above, both for the larger industrial enterprises and for smaller handicrafts, must, the Governor-General in Council thinks, in the main depend upon Government and not upon private management. It is essential that the trade and the subjects of instruction should be properly selected, and this cannot safely be left to the chance of private enterprise in the same way as the establishment of ordinary schools where the curriculum is of a defined type. The function of a teacher of an industrial school is far more specialised than that of an ordinary school teacher, and the Government is better able than private individuals to offer secure employment to such a man.

16. Meanwhile, grants-in-aid should still be made for efficient industrial instruction in schools under private management. The organization of the existing schools, should, however, be carefully reviewed in the light of the criticisms which have been passed upon them. Their object being to produce intelligent artisans, the extent

to which they attain that object should be scrutinized; inappropriate trades should be discarded, and specialised instruction should be given in one or a few industries; the course of instruction in the school workshops should be supplemented by appropriate lessons in class, which should be differentiated according to the particular industry for which the pupil is intended. Where it is found that the passed pupils do not follow the trades that they have been taught, the remedy will be to take the necessary measures to restrict admission to the pupils who are likely to follow the industry, to direct the instruction specially and closely to a preparation for it, and to study all means of providing an easy passage from the school to the workshop.

17. The solution of the problem must rest mainly with Local Governments, and must be approached by them with reference to the general considerations above presented. They have been asked to be good enough, after consideration of the Committee's Report and the foregoing suggestions, to inform the Government of India of the action which they would propose to adopt and to state the industry or industries with which experiment should be commenced.

*[Resolution of the Education Dept. No. 31,
Dated 14th January, 1904; Papers relating
to Technical Education in India (1886-
1904), pp. 257-61, Calcutta (1906).]*

PAPERS RELATING TO NAINITAL INDUSTRIAL CONFERENCE, 1907.

Demand for industrial development and technical education in U.P.—general question of legitimate scope of governmental action in pioneering new industries and assisting decaying industries discussed—creation of a special department for industrial enquiries and education suggested—scheme for establishment of technological institute at Kanpur—plan of reforms in technical educational system—improvements in Lucknow Industrial School and institution of additional such schools proposed—scheme for development of Thomason College, Rurki—grant of right of private practice to technical experts suggested—promotion of handicrafts and establishment of school of industrial design—improvement of handloom cotton weaving industry—establishment of chrome leather tanning school devoted to manufacture of agricultural requirements—school of carpentry at Bareilly and attached of a class for learning glass-bowling at Rajpur factory—recommendations regarding particular industries.

FROM

F. E. TAYLOR, ESQ.,

SECRETARY TO GOVERNMENT,

UNITED PROVINCES.

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,
HOME DEPARTMENT.

Dated Naini Tal, the 7th September, 1907.

SIR,

I AM directed to forward, for the information of the Government of India, a copy of the resolutions passed by the Naini Tal Industrial Conference, which commenced its deliberations on the 19th and closed them on the 31st August 1907.

2. The reasons which led His Honour the Lieutenant Governor to summon the Conference, the scope of the enquiries, the present state and future possibilities of the question, and the constitution of the Conference will be found in His Honour's inaugural address, which accompanies this letter.

3. The interest taken by the public in the Conference might, in Sir John Hewett's opinion, even if it stood alone, be taken as sufficient proof of the importance and, indeed, the urgency of the questions at issue. But it does not stand alone. There is evidence on many sides that the time is ripe for action. During his cold weather tours the Lieutenant-Governor was repeatedly urged by Indian gentlemen to take up the question of industrial development and technical education. Much money, His Honour was assured, would be invested in industrial concerns if local enterprise were assisted and if technically trained Indians were available. There has been an extraordinary demand for admission to the new technical class at Rurki. In sending up thirty-seven names for five nominations allotted to him, a well known business man of Meerut wrote to the Principal of the college,—

I must express my and my countrymen's heartfelt thanks for the new opening and career which you are trying to provide for our children. In fact the new classes in your college have attracted so much attention in the United Provinces that students of good ability and high standing are all coming in numbers and enquiring whether they can have a place in your college..... There is plenty of capital and trading skill, but it is simply the education in these directions which is wanting.

Indeed, this technical class could have been filled four times over in its first year. Even Oudh, the most conservative and agricultural portion of the province, has shown signs of awakening. In March last a weaving school was started at Bara Banki with the assistance of some taluqdars of the district. Already twenty-eight looms of the Salvation Army pattern, three hosiery machines, and twelve Benares looms for silk have been set up. The taluqdars send weavers from their estates to learn the new methods, buy the products, and start the weavers with improved looms in their villages on their return from the school. The earnestness of the educated public upon this question has been reflected in the attitude of the members in committee. The discussions were practical throughout; there was no attempt to make speeches; and the Indian members insisted on attending sub-committee meetings as spectators when they were not members of them. There was considerable variety of opinion when the Conference began; there was not a single note of dissent to the resolutions finally passed. The general feeling was voiced by an Indian member, who said—Europeans and Indians can only have one object here, to see that something is done for the good of the province.

4. The resolutions fall into three groups according to their subject matter. The first group deals with the general question of

the legitimate scope of Government action in pioneering new industries and assisting nascent or decaying industries. The second group is concerned with technical education. The third group collects recommendations in regard to particular concerns. It will be convenient to take these groups in order, merely touching on the minor questions which the Local Government can dispose of without the sanction or the financial assistance of the Government of India.

5. *General industrial questions.*—In the forefront of their proposals the Conference place the constitution of a special department under the control of an officer to be styled Director of Industrial Enquiries and Education. To this proposal, which has the support of Sir Edward Buck (paragraph 6, page 16 and page 33, of his report), the Industrial Education Committee (paragraph 49 of the report), the Simla Conference (resolution no. 34 on technical education), and the Cawnpore Chamber of Commerce, all the members of the Conference, the Director of Public Instruction assenting, attach the greatest importance. The Lieutenant-Governor strongly supports this recommendation. It is necessary that the Local Government should have an expert adviser on these questions. Technical education cannot anywhere be satisfactorily directed apart from practical needs; and in this country, with the strong literary tendencies of the Educational department and the Universities, it is especially necessary to connect technical education directly with practical industrial work. Indeed, Sir John Hewett is convinced that to hand technical education over to the Educational department would throttle it at its birth. His Honour is advised that in the Western countries whose system of administration most closely resembles the Indian system, *viz.*, Prussia and France, the control of technical education, except in the case of institutes of university rank, has been made over to the department which deals with questions of trade. Any danger that general educational considerations might be overlooked will be fully met by the constitution of the board of control recommended in resolution no. 2, on which the Director of Public Instruction will have a seat, and the general supervision which will be exercised by the Director General of Education. The Conference were of the opinion that the salary and position of the Director of Industrial Enquiries and Education should be in no way inferior to that of the Director of Public Instruction, and Sir John Hewett accepts this view.

6. It was the unanimous opinion of the members of the Conference that the establishment of a technological institute should be the first and paramount objective; and it is recommended on the

ground of economy that at the outset the Director of Industrial Enquiries and Education should also perform the duties of head of the Technological Institute at Cawnpore. The proposal commends itself to the Lieutenant-Governor. In the primary organization of the department both technological knowledge and local experience are required; the Director of Industrial Enquiries and Education will contribute the former, and the Board of Control will supply the latter.

7. The ways in which Government may properly assist industrial enterprise are indicated in recommendations 4 to 15 inclusive. It is made a condition of pioneering an industry that no such industry exists in the province, and that as a rule the Government business should be sold as soon as private capital is attracted to it. With these restrictions there can, His Honour thinks, be no reasonable objection to the pioneering of industries. As regards nascent industries the general statement in resolution 5 that the Government may properly assist new industries and schemes is illustrated and limited to some extent, though not entirely (for unexpected conditions may arise), by the two following resolutions, to the effect that assistance should not be given to individuals, but only to companies or bodies of men, and, further, that assistance should be given only when the result is likely to be of general industrial advantage, and then only under conditions of publicity. To these carefully qualified recommendations exception will probably not be taken. The adjective resolutions for the dissemination of information, the exploitation of markets, and the provision of expert advice will be carefully considered by the Local Government. Two recommendations, based largely on Mr. Chatterton's experience in Madras, call for special notice—the simplification of procedure in business concerns managed by Government (resolution no. 9) and the provision of expert advice to enquirers, especially in the matter of purchase of machinery (resolution no. 11). As regards the former, a free hand is clearly required in the appointment and dismissal of employés in the acceptance of contracts, the purchase of stores, and in varying the rate of commission paid to agents according to the state of the market and the volume of business they bring in. The latter relates to a matter which has frequently come directly under the Lieutenant-Governor's notice both in the United Provinces and elsewhere. The instances in which genuine effort by Indians to establish small industries have led to failure owing to unsuitable or obsolete machinery having been purchased are many. There are, indeed, as Mr. Shakespeare, the representative on the Conference of the Cawnpore Chamber of Commerce, pointed out, obvious risks of misunderstanding when Government officials "become consulting engineers"

and recommend particular firms: on the other hand, the need of expert advice is great and private "consulting engineers" are not as yet available. The Conference were unanimous in this recommendation; it is one which under present conditions His Honour cordially supports, and in his opinion the head of the department may be trusted to see that discretion is exercised in the doubtful cases—they will be few—which may arise.

8. *Technical education*.—The general propositions or axioms laid down in resolution no. 15 will probably commend themselves to the Government of India without further remark. The scope of the problem is indicated in resolution no. 16 as follows:—

- (i) how to adjust general education so as to predispose boys to industrial work, or break down prejudice, already showing signs of being shaken, against manual labour;
- (ii) how to train technically—
 - (a) workmen, foremen, overseers, and leaders or managers for the organized industries;
 - (b) investigators;
 - (c) workmen in local industries practised as handicrafts;
 - (d) technical instructors.

9. The reforms in the general system of education suggested in resolutions nos. 17 to 23 inclusive are necessary to carry out the policy of the Government of India, quite independent of the present proposals. The absence of facilities for any but a literary education is referred to at some length in Sir John Hewett's address. The Government of India have already been addressed in this Government's letter no. 729 dated the 16th August 1907, regarding the improvement of secondary education. It is essential, in order to carry out the principles continuously advocated by the Government of India since the report of the Education Commission, that manual training, in the form of the Slöjd or some similar system, should be introduced into the general school course with the object of educating both the eye and the hand; that science should be taught in the secondary schools, and that, where it is taught, the apparatus should, as the Government of India insist in Sir Herbert Risley's letter no. 761, dated the 10th October 1906, be of a kind to take part in some practical work; that there should be an extended modern side in the high school, and that provision should be made for a commercial course in the high schools and for a higher course

in colleges in the same branch of study (*vide* paragraphs 149 to 151 of the Indian Universities Commission's report). The Lieutenant-Governor is anxious to introduce these reforms at once. The only obstacle is shortness of funds: he trusts that the Government of India will, in the approaching determination of the financial settlement with this Government, be able to give favourable consideration to his needs in endeavouring to carry out the policy enunciated by them. The matter will be separately discussed, and it is not necessary to do more than refer to it here.

10. There is a great demand for fitters, turners, pattern makers, moulders, and mechanics generally. To supply these it is proposed to improve the Lucknow industrial school and open somewhat similar schools at seven important towns in the province. The Lucknow school has at last, since machinery has been erected, met a real want. Over fifty sons of artizans are now on the rolls, most paying fees; and there is a steady demand from outside for boarding house accommodation. The superintendent of the Lucknow railway workshops is anxious to get boys from the school: the railway authorities at Gorakhpur and the Chamber of Commerce at Cawnpore also desire that such a school should be erected locally, and undertake to do their best to find employment for the boys and to keep records of their careers. A commencement may be made with schools at Gorakhpur and Cawnpore. Acting on the experience gained at Lucknow, the age limits will be fixed at twelve and sixteen years respectively, the text books and regular courses of the Educational department will be discarded, and there will be no external examinations. The bulk of the instruction will be practical; but the boys will be taught concurrently practical mathematics, industrial drawing, and enough practical English to help them in their work. All the employers of labour on the conference regarded some knowledge of English as essential.

11. An effort will also be made to open evening classes for men employed in works, such as railway workshops, which have not long hours. The Cawnpore Chamber were most emphatic about the uselessness of trying to get the mill hand to improve himself during his short hours of leisure; and this view was accepted by the Conference. But a determined effort will be made, and that without delay, to induce the mill owners to open schools, with Government aid, in their mills and model villages for half-times. The Cawnpore Chamber has indicated approval of this scheme, and His Honour the Lieutenant-Governor is so impressed with the importance of educating the children of operatives that he intends to

visit Cawnpore at an early date in order to see, in personal communication with the employers of labour, what can be done.

12. It was the unanimous opinion of the Conference that the first step towards industrial advance in the United Provinces after the appointment of a Director must be the establishment of a technological institute, which would undertake industrial research and train the educated classes to be managers, overseers, foremen, and investigators. Upon this point there was no doubt or difference of opinion. As to the location and constitution of the institute there was some discussion. A proposal to have the whole institute at Rurki was rejected with little delay, on the ground that its distance from the centre of industrial work in the province would interfere with the prosecution of a good many of the problems that have to come under examination in such an institution. A proposal to have the whole institute, including an engineering branch, at Cawnpore was rejected after much discussion on the ground of cost. Eventually it was decided that the best and most economical course was to concentrate engineering work at Rurki, developing the Thomason College and raising it to the level of research work; and to concentrate industrial work at Cawnpore. This decision commends itself entirely to the Lieutenant-Governor.

13. Under this scheme the subjects to be developed at Rurki would be hydraulic, mechanical, and electrical engineering. Mechanical engineering is at present taught by an instructor; and electrical engineering, so far as it is taught, is attached to the professor of physics. Sir John Hewett is advised that there is great scope for research in hydraulic engineering, and that the Irrigation department would benefit largely from the constitution of a chair in the subject at Rurki. In the first instance His Honour, with a view to effecting economies, remitted the question of adding this new chair to Rurki back to the Conference for further consideration; eventually he felt bound to defer to the unanimous opinion of the Conference, which was supported by the Chief Engineer of the Irrigation branch. The question of establishing chairs for railway engineering and architecture was raised; but it was decided that these were not essential at present. As to the extra staff required, hydraulic and electrical engineering will each require a professor and a demonstrator. Mechanical engineering will require a large additional staff in view of the demand for highly trained mechanics, which is evidenced by the popularity of the new technical class, no less than by the repeated requests of mill owners and other employers of labour for such men. The mechanical classes, it is clear, will have to be expanded at an early date and a professor and an instructor of

mechanical engineering, together with one European and two Indian assistants, will be required to keep level with the demands which are certain to be made. Some knowledge of practical geology is required for engineering, and the Conference recommend the appointment of a demonstrator in this subject. A personal assistant will be required to relieve the Principal of routine work, which will increase greatly when the college becomes a technological institute. These proposals are accepted by the Lieutenant-Governor.

14. It is intended that the Cawnpore institute should be an Institute of Chemical Technology. The Lieutenant-Governor is advised from all sides that there can be no real industrial progress until technological chemists get to work locally on the problems of the local industries. The four branches of applied chemistry requiring special research and treatment from the industrial point of view in this province are—(1) sugar, (2) leather, (3) acid and alkali manufacture, and (4) dyeing, bleaching, printing, colouring, and finishing of manufactured goods, and paper making. It will be necessary, in the opinion of the Conference, to add a textile department later on; but for the present it is not necessary to incur the heavy expenditure which such a department would involve; the problems of handlooms will be sufficiently provided for by the appointment of an expert in weaving (paragraph 20 *infra*). It is scarcely necessary to urge the claims of sugar and leather in the United Provinces. The future of several industries depends on the manufacture locally of sulphuric acid and caustic soda. The future of the weaving industry is closely bound up with improvements in dyeing, bleaching, and the finishing processes generally. None of these subjects have yet been investigated thoroughly from the industrial point of view.

15. The Head of the institute might with the help of an assistant deal with general applied chemistry and acids and alkalis. As he would at the outset be Director of Industrial Enquiries and Education it is desirable that he should have some knowledge of engineering. The salary recommended for the combined post is Rs. 2,000 per mensem. The Lieutenant-Governor hopes that first rate chemists with considerable experience of technological work, who have specialized in sugar, leather, and bleaching, dyeing, &c., can be obtained for a salary of £1,000 per annum or Rs. 1,250 per mensem with the right to private practice, but he feels convinced that the kind of man that is required will not be obtained if the inducements offered to him are less than these. A chemical engineer is required with a view to carry out experimental work under industrial conditions and to teach students the amount of engineering required

for their work. The salary recommended for him is Rs. 500—1,000 with the right to private practice. Four assistant professors (Indians) on a salary of Rs. 250—400 per mensem, the pay of professors in Government colleges in the province, also with the right to private practice, would complete the superior establishment.

16. The Conference attach the greatest importance to the provision of good salaries for the experts who are to be recruited from England and to the encouragement of private practice. Without these attractions it is feared that the right stamp of man will not come to India. Indeed, the Conference in the first instance recommended salaries of £1,500 a year, with a view to secure really first rate men. The Lieutenant-Governor did not see his way to recommend this as he was informed that the Government of India expect to obtain men for the Indian Institute of Research for a salary of £1,000 a year; but he is also aware that good technological chemists make large incomes in the West, and he would willingly accept any salaries in excess of those proposed which may be found necessary to attract really first class men if His Majesty's Secretary of State for India finds that they cannot be procured on the terms suggested. His Honour is advised by all who have knowledge on the point that it is essential to grant the right of private practice—first, to secure the right men; secondly, to keep them in touch with practical work. He recognizes that this may be regarded as a new departure in the conditions of employment by the State in this country, but it seems to him that, in this respect at any rate, we must follow the practice in other countries if we expect to get men of the right stamp.*

17. As further means of keeping the work of the institute practical it is recommended that a board of visitors of businessmen should be appointed, and that they should be represented on the College council. It was stated at the Conference that the detachment of the Victoria Institute from the business world of Bombay had greatly lowered that institution in public estimation, and correspondence in the press some time back lends colour to that view. Further it is desired that the professors, both at Rurki and Cawnpore, should travel about as much as possible, so that they may keep in touch with the practical conditions of the problems which they are investigating.

*In this connection reference may be made to the report of Professor W. E. Ayrton, F.R.S., Professor of Physics in the City and Guilds of London Institute, past President of the Institution of Electrical Engineers (pages 30 to 33, Reports of the Moseley Educational Commission to the United States of America, 1903).

18. The number of students at the institute would never be large. It is proposed to accept the B.Sc. degree of the Allahabad University as the qualification for entrance. But it is also proposed—some elasticity being required at the outset—to admit men who may not have obtained the B.Sc. degree but who satisfy the college authorities that they have sufficient scientific training to study at the institute. It is recommended that fifteen scholarships of Rs. 50 per mensem tenable for three years and six studentships of Rs. 100 per mensem for research, also tenable for three years, should be offered annually. Should His Excellency in Council so desire, Sir John Hewett would be glad to reserve ten places in the institute for the inhabitants of other provinces. Mr. Chatterton, who has much experience in such matters, has informed His Honour that there would be a desire in all parts of India to go to study at an institute such as is proposed at Cawnpore.

19. So long ago as 1891 a committee appointed by Sir Auckland Colvin to examine the question of technical education recommended that a school of art should be opened at Lucknow. The suggestion was dropped as art schools came under a cloud about that time; and it is not revived in the same form now. What is wanted for the handicrafts is a school of industrial design: in nothing are hand-made goods more handicapped in competition with foreign goods than in the poverty of their designs. It is proposed in connection with the school of design to have a sale room for the exhibition of high class art products; this is likely to be patronized by tourists who are prepared to give high prices. This form of exhibition has been successful in Madras, and serves a very valuable purpose in enabling handicraftsmen to devote time to their work in the expectation that they will get a good price for a really good piece of workmanship. The Lieutenant-Governor accepts the view that a principal for the school will have to be obtained through the Secretary of State—he should have had considerable experience in the organization of a school of arts and crafts—but that the subordinate staff may with advantage be recruited in India. The initial cost will be considerable, but by degrees the institution should tend to become self-supporting, and the good that it may do is incalculable.

20. As regards improvements of handloom cotton-weaving there are two schools of thought. The one favours the maintenance of the cottage industry as such, and would devote efforts to the improvement of looms for weaving, the design of simple appliances to reduce the labour of the primitive processes of warping and sizing now employed, and the organization of co-operation among weavers: the other favours the establishment of the factory system. There is much

to be said for either theory. The advantages of the cottage system are that the family is kept together and can carry on some subsidiary occupation. The advantage of the factory system is that it secures economy in working and facilitates the purchase of material and the disposal of products, it being possible to deal with handloom factories upon a wholesale basis: the factory system also teaches weavers habits of order and regularity and affords openings for the educated class as managers and overseers. The Conference came to the conclusion that there was scope for both systems, and that both should be given a trial in the efforts to assist the handloom industry. The recommendations of the Conference are to have a central experimental station, or school, at Benares on the lines of the Salem factory conducted successfully by Mr. Chatterton in Madras; and three smaller demonstration schools for familiarizing cottage weavers in the first instance with the use of the fly-shuttle and with the simpler improved methods of warping. The central experimental school should be conducted by an European expert who has knowledge of the latest weaving appliances and of the series of improvements which have marked the progress from the old looms to the latest pattern loom. It is also proposed to attach to the school, under his general supervision, a smaller school of silk-weaving, for which a qualified instructor could be obtained in India. Arrangements have already been made to start the three demonstration schools.

21. The successes obtained with chrome leather in Madras have induced the Conference to recommend the establishment of a chrome leather tanning school, to which a school for teaching boot and shoe-making with improved tools would be attached. The industry is a very important one in this province in view of the large export of raw hides to other countries. This is the only industry which the Lieutenant-Governor desires at present to pioneer. Should the experiment be successful there would be no difficulty in selling the business to private capitalists. In order to avoid competition with existing leather factories the new factory would be devoted entirely to the manufacture of chrome leather suited to agricultural requirements, *e.g.* for water bags and well buckets; it would not be equipped with machinery for producing high class leathers. His Honour is advised—and experience in Madras supports the view—that unless Government steps in to assist the agricultural classes nothing will be done. It would not pay a private capitalist to incur the expenditure required for pioneering the industry as the expense of getting a market for chrome leather among the agricultural population would be considerable, and numbers of firms would spring up once the market was assured, and would deprive the pioneering firm of the

profits of their enterprise. Qualified managers and instructors could be obtained or trained in India.

22. The Conference has, wisely in His Honour's opinion, confined itself to proposals to meet the more pressing needs of the province; and a school of carpentry at Bareilly—an important centre for carpenters—under a first rate European carpenter, and the attachment of a class for learning glass-blowing to the Rajpur factory, complete the recommendations in regard to technical education.

23. *Recommendations regarding particular industries.*—The recommendations of the Conference under this head are mostly confined to the making of enquiries into several questions, *e.g.* the process of weaving ramie yarn; the possibility of developing practically efficient small-power plants for oil mills, flour mills, pumping, &c.; the existence of woods suitable for wood-pulping for paper manufacture and for matches; the possibility of starting a gold thread industry against the competition of the Lyons industry, which has driven Indian gold thread from the market; the possibility of producing in this province the yarn for Kashi silk now obtained from Italy; the extent of the competition of German perfumes with locally made perfumes; the possibility of enlarging the supply of bark for vegetable tanning. These enquiries will be instituted without delay. Two recommendations involve action at the present stage *viz.*, the purchase of an experimental plant for expressing cotton-seed oil (58), and the enlistment of the services of an expert in button-making (64). I am to say that the Lieutenant-Governor has already made arrangements for the conduct of the former experiment by the Cawnpore Chamber of Commerce. In regard to the latter His Honour is advised that there is scope for the manufacture of buttons on a large scale, and I am to ask that an experienced button-maker may be obtained from England for a period of two years. It is proposed that he should carry on his work at the Lucknow industrial school.

24. The financial effect of the proposals, with particulars as to the experts whom it is desired to obtain from England, are given in detail in an appendix to this letter. The results may conveniently be tabulated here:—

	Non-recurring Rs.	Recurring Rs.
Industrial Schools	2,50,000	37,500
Technological Institute	2,00,000	88,000
	8,00,000	2,61,400

	Non-recurring Rs.	Recurring Rs.
School of design	1,45,000	29,340
Experimental weaving station	73,500	19,100
Chrome leather school	45,000	12,000
Carpentry school	33,000	8,540
Button-making experiment	6,000	..
TOTAL	15,52,500	4,55,880

The estimates are approximate only, and I am to say that the Lieutenant-Governor will undertake to introduce the scheme on a capital expenditure of 15 lakhs and a recurring grant of $4\frac{1}{2}$ lakhs a year.

25. Sir John Hewett earnestly hopes that these proposals, which are the outcome of prolonged and careful discussion by experts and men of business, will receive the sanction and the financial support of the Governor-General in Council, to whose declared wishes he has consciously spared no efforts to give effect. The cost of the scheme may appear to be high in relation to expenditure as contemplated hitherto in India, but it falls far short of the expenditure on single institutions in Europe. For example, the capital cost of the Charlottenburg and Manchester institutes was 75 and 45 lakhs respectively, and the maintenance charges of the two institutions amount to over 10 lakhs and 6 lakhs a year. In the State of Wurtemberg with a population of two millions the expenditure on industrial education amounted some years ago to over 9 lakhs a year. The capital and maintenance expenditure now proposed represent respectively half an anna and less than one-sixth of an anna per head of the population of the United Provinces. The Lieutenant-Governor has no doubt the Government will obtain a rich return for its outlay not only in the increased well-being but also in the greater contentment of the people; for there can no longer be any doubt that the public eagerly desires a vigorous policy of industrial development, and that such a policy is well calculated to unite all classes of the community, and to draw them through material progress along the paths of political peace.

I have the honour to be,

SIR,

Your most obedient servant,

F. E. TAYLOR,

Secretary.

FINANCIAL APPENDIX

Financial effect of proposals recommended by Nainital Industrial Conference.

Industrial schools.—The initial cost of each of the new schools at Cawnpore and Gorakhpur may be taken at—

	Rs.
Site	10,000
Workshop	25,000
Quarters for headmaster	10,000
Tools, including machine tools and plant	35,000
Boarding house	20,000
TOTAL	1,00,000

The enlargement of the Lucknow school may be estimated at—

	Rs.
Extension of site in bazar	10,000
Boarding house	20,000
Additional workshop accommodation	10,000
Additional tools and plant	10,000
TOTAL	50,000

The non-recurring expenditure will therefore be $2\frac{1}{2}$ lakhs.

The annual upkeep of the Lucknow school at present is Rs. 15,000. The subordinate staff of the new schools will require to be of much better quality than that of the Lucknow school (they should draw from Rs. 75 to Rs. 200 per mensem); and the annual cost of materials and plant will be considerably greater. It would not be safe to estimate the annual expenditure at less than Rs. 20,000. On the other hand, the schools should be made to be self-supporting as far as possible. At the outset it would not be safe to estimate receipts at more than Rs. 2,500. The cost of the schools may therefore be put at Rs. 17,500.

The total recurring charges on the industrial schools would therefore be—

	Rs.
Cawnpore and Gorakhpur at Rs. 17,500 each	35,000
Additional for Lucknow	2,500
TOTAL .	37,500

Two head masters would be required on Rs. 300—40—500 per mensem. They should be recruited in England and be men of the position of foremen mechanics who have had technical training.

2. *Technological Institute, Rurki.*—The following additional buildings will be required:—

	Rs.
One residential block for three new professors at Rs. 12,000 each . .	36,000
„ for three instructors or assistants at Rs. 8,000 each	24,000
„ for four demonstrators at Rs. 2,000 each	8,000
TOTAL .	68,000
Hydraulic laboratory	12,000
Offices for the professors of mechanical and electrical engineering .	8,000
Hostel	21,000
Cooking and bathing accommodation	7,000
Additional workshops	32,000
Three new class rooms	15,000
Tools for additional students, including lathes	25,000
TOTAL .	1,20,000
GRAND TOTAL .	1,88,000

Another non-recurring charge is a grant of Rs. 12,000 to bring the library up to research standard. These would make the total additional expenditure two lakhs.

The following additional staff will be required:—

	Rs.
<i>Hydraulic Engineering—</i>	
One Professor, Rs. 500—1,000	10,000
One Demonstrator on Rs. 150	1,800

Mechanical Engineering—

	Rs.
One Professor	10,000
One Instructor in mechanics, steam, and heat Rs. 500—750 . . .	8,000
One European assistant, Rs. 300—500	5,200
Two Indian assistants at Rs. 150 and 250	4,800

Electrical Engineering—

One Professor	10,000
One Demonstrator at Rs. 150	1,800
One Demonstrator in Geology, Rs. 150—200	2,200
One Personal assistant to the Principal at Rs. 250—30—400 . . .	4,200

and

A lump allotment for research work	20,000
Increase in minor establishment, materials, &c.	10,000

TOTAL	88,000
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The professors of hydraulic, mechanical, and electrical engineering and the instructor in mechanics, steam, and heat will need to be recruited through the Secretary of State.

3. *Technological Institute, Cawnpore.*—The non-recurring expenditure may be estimated as follows:

	Rs.
Four laboratories at Rs. 50,000	2,00,000
One workshop	20,000
Central block, Principal's office, central lecture room, museum, main library, room for clerks and usual offices	50,000
Equipment for four laboratories	2,00,000
Equipment for workshops	30,000
Grant to start a library	20,000
Bookshelves and furniture for library	5,000
TOTAL	5,25,000

Five houses at Rs. 20,000	1,00,000
Four houses at Rs. 8,000	32,000
Hostel	35,000

In addition there will be the cost of the site, Rs. 75,000, roads, initial cost of water and electric supply, drainage, and laying out the place, Rs. 33,000	1,08,000
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TOTAL	2,75,000
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The total non-recurring expenditure will thus amount to 8 lakhs.

The recurring expenditure would be—

	Rs.
Head and Director at Rs. 2,000	24,000
Three chemists at Rs. 1,250 per mensem	45,000
One assistant to Director (chemical engineer), Rs. 500—1,000	10,000
Four assistant chemists at Rs. 250—400	16,800
Establishment, including head assistant, librarian, clerks, laboratory staff &c.	12,000
Travelling allowance	8,000
TOTAL .	1,15,800
Maintenance of research laboratories and shed	50,000
Power and light and water supply	25,000
Purchase of books for library	5,000
Publication of results of research	5,000
Upkeep of buildings	12,000
Six studentships at Rs. 100 per mensem tenable for three years	21,600
Fifteen scholarships of Rs. 50 per mensem tenable for three years	27,000
TOTAL .	1,45,600
GRAND TOTAL .	2,61,400

4. *School of design.*—The non-recurring expenditure will be—

	Rs.
Land	10,000
Main building	90,000
Principal's quarters	15,000
Workshops	15,000
Equipment	15,000
TOTAL .	1,45,000

The recurring expenditure will be—

	Rs.
1 Principal, Rs. 500-1,000	10,000
1 Assistant principal (Indian) Rs. 250-400	4,200
1 Drawing master on Rs. 100	1,200
1 Drawing master on Rs. 50-75	800
1 Drawing master on Rs. 40	480
2 Mistris, metal work, Rs. 30 and Rs. 40	840
1 Mistri, wood-carving, Rs. 40	480
1 „ stone-carving, Rs. 40	480
1 „ modelling „ „	480
1 „ carpentry, Rs. 40	480
Cost of materials in excess of receipts	4,000
Stipends for apprentices	5,000
Office establishment, peons and servants	2,500
	<hr/>
	30,940
Less fees from students	1,600
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TOTAL	29,340

The Principal will have to be recruited in England. He should have had considerable experience in the organization of a school of arts and crafts.

5. *Experimental weaving station.*—The central cotton-weaving experimental station must be on a fairly large scale if it is to serve any useful purpose. The non-recurring expenditure will be—

	Rs.
<i>Cotton</i> —	
Building	20,000
Jacquart harness, &c.	10,000
Warping apparatus &c.	10,000
100 looms at Rs. 100	10,000
4 hosiery machines at Rs. 250	1,000
	<hr/>
TOTAL	51,000

Silk—

	Rs.
Building	5,000
Jacquart harness, &c.	4,000
10 looms at Rs. 100	1,000
TOTAL .	10,000
Quarters for European cotton expert	10,000
„ Indian silk expert	2,500
TOTAL .	12,500
GRAND TOTAL .	73,500

The recurring expenditure will be—

	Rs.
1 European cotton expert, Rs. 500-40-700	7,600
1 cotton assistant, Rs. 150-200	2,200
1 silk assistant, Rs. 150-200	2,200
3 apprentices on Rs. 25	900
Office, sale department, and peons	1,200
Experimental work	5,000
TOTAL .	19,100

No allowance is made for materials or wages to the weavers. The receipts from sales should pay for these.

The figure of the European expert's salary is that sanctioned for the similar officer in the Bombay School of Art. The qualifications required are knowledge of the latest weaving appliances and of the series of improvements which have marked the progress of hand-weaving from the old looms to the latest pattern loom.

6. *Chrome leather school*.—The non-recurring expenditure will be—

	Rs.
Land, buildings, and pits	25,000
Equipment—drums, shafting, engine, staking machine, rollers, frames	20,000
TOTAL .	45,000

The recurring expenditure will be—

	Rs.
Superintendent on Rs. 250-400	4,200
Two assistants at Rs. 100	2,400
Office	1,200
Expenditure on agency (for three years) and other miscellaneous expenditure	4,200
TOTAL	12,000

The school for boot and shoe-making would cost only a small sum.

7. *Carpentry school at Bareilly*.—The non-recurring expenditure will be—

	Rs.
Workshop	12,000
Machines and tools	11,000
Instructor's house	10,000
TOTAL	33,000

The recurring expenditure will be—

	Rs.
Instructor, Rs. 250-400	4,200
Three mistris at Rs. 50, Rs. 40 and Rs. 30	1,440
Scholarships and stipends	5,000
Office establishment and menials	900
	11,540
Excess of sale proceeds over cost of materials	3,000
TOTAL	8,540

No allowance is made for materials as the sale proceeds of the articles manufactured will more than cover their cost.

A first class carpenter, recruited from England, is required.

8. *Button-making*.—This Government has no information as to the terms which an English button-maker will require. It is estimated that a workman capable of experimenting can be obtained for Rs. 250 per mensem. As he is required for only two years a sum of Rs. 6,000 non-recurring is allowed.

9. The necessary proposition statements are under preparation and will follow in due course.

RESOLUTIONS PASSED BY THE INDUSTRIAL CONFERENCE AT NAINITAL ON SATURDAY, 31ST AUGUST 1907.

General Industrial Questions

THERE should be a special department to deal with industrial questions and control technical education. Organization. The department should be directed by an officer to be styled the Director of Industrial Enquiries and Education. He should have experience of the country, and, if possible, be an engineer with a knowledge of chemistry and some acquaintance with industrial work. It is important that he should deal direct with Government.

At the outset the Director would also be the head of the Technological Institute, Cawnpore (*vide* resolution no 36 *infra*).

2. There should be a board for co-ordinating all work connected with industrial problems and problems of technical education. Such a board might include the Director of Public Instruction, the Director of Land Records and Agriculture, the Registrar of Co-operative Credit Societies, the Secretary to Government in the Irrigation Department, and two non-official gentlemen besides the Director of Industrial Enquiries and Education. The board should meet periodically, and it would be an advantage that one of the Secretaries to Government should preside at its meetings.

3. The Government may properly pioneer industries which do not exist in the province; but it should as a rule offer any business so pioneered for sale as soon as private capital has been attracted to it. Pioneering industries.

4. When it has been definitely decided, after thorough examination, to assist or pioneer an industry, it should be an instruction to Government departments to purchase the manufactures of that industry as far as possible without prejudice to the public interest.

5. The Government may properly assist new industries or schemes. Assisting new industries.

6. The Government may properly make money grants for definite purposes to new enterprises if the result of the action to be taken with the assistance thus afforded is likely to be of Grants to new industries.

general industrial advantage. In such cases, wherever possible, the result of the action taken should be published.

7. The Government may properly make loans or advances to co-operative societies of artizans, as it does to co-operative societies of cultivators on the joint personal security of the members; but it is not advisable that Government should make loans or advances to individuals.

Loans and advances.

8. The Government may usefully take action to advertise new industries and disseminate information through the press, English and vernacular, and otherwise. A trade journal in the vernacular would be an advantage, but it should be really efficient, paying for information and articles and accepting advertisements; and it should be edited by an officer of the Industrial department, who should receive special remuneration for the work. An industrial directory of the province should be issued by the department in the vernacular.

Dissemination of information.

9. The exploitation of markets is of the greatest importance; and Government officials should be allowed to adopt ordinary commercial methods for the encouragement of new industries, *e.g.*, they should have free power to send out travellers, appoint and remove agents, grant and alter the rate of commission, and so on, untrammelled by financial regulations.

Exploitation of markets.

10. Exhibitions should be encouraged, especially exhibitions with definite competitions and liberal prizes for products, methods, and workmanship; and advantage should be taken of established *melas* to open exhibitions. In the case of industries connected with agriculture lectures could usefully be arranged for.

Exhibitions and lectures.

11. The advice of Government experts should be available to the public on payment of fees (to be remitted, at the outset, where necessary) in such matters as the purchase of machinery. To avoid any appearance of preference to particular firms, some restrictions should be laid down.

Utilization of Government experts.

Either the experts should be limited to condemning what is bad and unsuitable; or they should be restricted to preparing specifications; or, again, if they recommend anything, they should recommend alternatives.

12. The co-operative principle should be encouraged among the industrial classes, the establishment of the Registrar of Co-operative Credit Societies being strengthened for the purpose. In particular, officers, of the stamp of a tahsildar, should be trained, if possible at the Technological Institute, and be sent out to organize co-operative credit and assist in starting industrial enterprise on a co-operative basis.

13. A system of offering rewards for inventions should be developed.

14. While little can be done directly by jail labour to develop nascent industries or support decaying industries, jail superintendents should be instructed to assist the Director of Industrial Enquiries and Education as far as possible.

GENERAL QUESTIONS OF TECHNICAL EDUCATION

15. The following general propositions should be observed in any scheme of technical education that can hope for success:—

- (i) technical work should be connected with a local industry of the province and have a definite object.
- (ii) the teacher should be a practical expert and should be given a free hand; in the scientific branches he should be an investigator and have time for research; in the manipulative branches he should have been in works;
- (iii) money must be spent freely on experimental work, and in keeping up to date all apparatus, tools, plant, and appliances.

16. The scope of the problem may be defined as—

- (i) how to adjust general education so as to predispose boys to industrial work, or break down prejudice, already showing signs of being shaken, against manual labour;
- (ii) how to train technically—
 - (a) workmen, foremen, overseers, and leaders or managers for the organized industries;
 - (b) investigators;
 - (c) workmen in local industries practised as handicrafts;
 - (d) technical instructors.

17. *Manual training* should be introduced so far as practicable
 General education. into the general school course for all classes
 Manual training. — of schools.

18. Practical scientific work should commence with the upper
 middle stage in English schools. There
 Science teaching. should be a lot of cheap apparatus which the
 boys can use freely. Provision is also required
 for a system of inspection by experts.

19. The high school course should include, in addition to the
 present alternatives (physics and chemistry,
 Modern side. agriculture and drawing),—

advanced mathematics,
 physics and mechanics,
 physiography,
 mensuration.

20. There should be a commercial course in the high schools in
 Commercial education. the following subjects:—

Book-keeping and commercial arithmetic.
 Commercial geography.
 Précis-writing, drafting, correspondence, and caligraphy.
 Type-writing.

21. A higher commercial course, lasting two years, should be
 arranged for some group of the following subjects:—

Advanced accounting.
 Modern business methods.
 Commercial law.
 Commercial history.
 Commercial geography.
 Precis-writing, drafting and correspondence.
 Type-writing.
 Shorthand.

22. Both courses should be terminated by an examination
 conducted by a board consisting of a representative of the Chamber
 of Commerce, a representative of Government, and a representative
 of the college staff. Certificates should be given to those students
 who satisfy the examiners. In both courses special attention should
 be paid to a practical knowledge of English.

23. A class for training commercial teachers should be attached
 to the Reid Christian College. And a higher commercial course
 should be started there and also, as funds permit, elsewhere.

24. Industrial schools should be opened at Cawnpore, Hathras, Agra, Allahabad, Meerut, Gorakhpur, and some town in the Rohilkhand division and the Lucknow school should be improved. A commencement should be made with new schools at Cawnpore and Gorakhpur, and with the enlargement of the Lucknow school.

Training of workmen in organized industries: industrial schools.

25. They should teach such subjects as fitting, turning, moulding, carpentry, pattern-making, electrical wire-work, plumbing, copper-smithy, tin-smithy, and be adequately equipped. The general subjects taught concurrently with the technical subjects should be practical mathematics, industrial drawing, and practical English taught by the direct method.

26. Boys should not be admitted to these schools unless they have passed the lower primary standard and are not less than twelve years of age and not more than sixteen. The course should be at least four years. There should be no external examinations. Each boy should have a record of his work and character, to be given to him on leaving. The headmaster and some member of the department should examine boys for certificates on leaving and give them certificates according to their attainments. A record should be kept of the boy's work after leaving the school. Employers of labour should be invited to inspect these industrial schools, and keep in touch with the students trained at them and keep records of their work.

27. Fees should be charged; but they should be remitted where necessary, and they should be remitted freely in the case of the sons of artizans. Scholarships to the limit of 5 per cent. of the number on the rolls might be given for merit. Stipends should be given to poor boys who belong to industrial castes, or who undertake to pursue an industrial career.

28. The head master should be recruited through the Secretary of State. He should have been a technically trained mechanic.

29. Evening classes may with advantage be opened at the industrial schools for workmen of railway workshops and other industries in which the hours of labour are not long. The instruction should be free; and money prizes should be given liberally to workmen who do well at these classes.

It would be useless to open such classes in connection with mills running long hours.

30. Suitable schools for the children of operatives should be started without delay in or near mills, or in model villages, in communication with the employers, who should be encouraged to assist.

31. There should be a technological institute for the United Provinces. It should be divided into two Technological institute. branches, the engineering branch being located at Rurki and the chemical branch being located at Cawnpore.

32. Foremen, overseers, and managers in organized industries employing machinery should be trained at one or other branch of the Technological Institute. They should receive a sound theoretical training with workshop practice before going to works, and should have a good practical knowledge of English. Investigators also should be trained at the Technological Institute.

33. The departments at Rurki would be—

- (a) civil engineering, including sanitary engineering, drawing, and surveying;
- (b) hydraulic engineering;
- (c) mechanical engineering;
- (d) electrical engineering;
- (e) chemistry;
- (f) physics;
- (g) mathematics and mechanics.

34. The departments at Cawnpore would be—

- (i) chemistry of sugar;
- (ii) chemistry of leather;
- (iii) general applied chemistry, including specially acid and alkali.
- (iv) bleaching, dyeing, printing, colouring and finishing of manufactured goods, and paper-making.

35. At the outset the Cawnpore branch should be an institute of chemical technology only. Textiles manufacture should be added hereafter when funds are available.

36. In the beginning and until the department is organized the head of the Cawnpore institute should, in addition to his duties as such, hold the post of Director of Industrial Enquiries and Education.

37. The Cawnpore institute should be reserved for higher work. It should be open to men who have obtained the B.Sc. degree of the Allahabad University, in the subject which they intend to pursue, or who satisfy the authorities of the institute that they have sufficient scientific knowledge in the subject which they intend to pursue.

38. A Board of Visitors consisting of businessmen should be associated with the Cawnpore institute.

39. There should be a council of the Cawnpore institute, consisting of the principal, the professors, and a representative of the Board of Visitors.

40. The professors should be encouraged to tour in order to direct their researches on lines suitable to the requirements of the province.

41. Both the Cawnpore and the Rurki institutes should grant their own diplomas. They should not be affiliated to the Allahabad University.

42. There should be a school of design at Lucknow, combined with a system of exhibition of high class art products for sale, as in Madras. Designing for textiles, metal work, wood and stone-carving, furniture, calico-printing, and modelling should be taught. Stipends should be given when necessary.

Training of workmen in local industries practised as handicrafts.
School of Design.

43. The principal should have had considerable experience in the methods and organization of a school of arts and crafts in the West.

44. There should be a system for the registration, reproduction, and loan of designs.

45. As a general principle industrial schools and schools of design should be self-supporting so far as possible.

46. An experimental cotton-weaving station, or school, should be started at Benares. Hosiery-making should also be taught. Workers should be paid daily wages combined later on with piece-work wages, and only persons with a practical knowledge of weaving should be admitted; but an apprentice school should as soon as practicable be attached for the instruction of persons who wish to take up the weaving industry, a fee being charged for such instruction. A half-time primary school should be started for boys employed in the experimental station.

Weaving schools.

47. Small demonstration stations, or schools, should be started at Tanda, Moradabad, and Saharanpur to popularize the simpler improved processes of warping and fly-shuttle weaving. They should be in charge of a skilled weaver controlled by a local committee. A primary school should be attached to each station.

48. A silk-weaving school should be attached to the cotton-weaving experimental station at Benares. An expert with an assistant, the former to be recruited through the Secretary of State, could manage the combined institution.

49. A school for teaching glass should be attached, if this can be arranged, to the glass factory at Rajpur. The students would require some preliminary training in chemistry and engineering and should have some knowledge of building furnaces. This preliminary instruction could be provided at Rurki.

Glass manufacturing schools.

50. A school for teaching chrome-tanning should be opened by Government, a school for teaching boot and shoe-making with improved tools being attached to it. Qualified instructors could probably be obtained in India.

Leather schools.

51. A school for teaching carpentry should be opened at Bareilly. It should be equipped with modern tools. The headmaster should be a first class European carpenter.

Carpentry school.

52. Subordinate teachers for industrial schools can be obtained from Rurki. A class for training manual teachers for English schools should be opened at the high grade training college under an officer of the Indian Educational service. Manual teachers for vernacular schools can be trained at the normal schools and training classes of the Educational department.

The training of technical instructors.

RECOMMENDATIONS REGARDING PARTICULAR INDUSTRIES.

53. It would serve no useful purpose to attempt to improve the
Textiles, & c. hand-spinning industry, which cannot compete with the mills.

54. The supply of warps to hand-loom weavers should be left to private enterprise.

55. The collection of groups of looms into factories should be encouraged as much as possible with the view of bringing about more economical working by enabling purchases and sales to be conducted on a more wholesale basis and by ensuring better supervision; and everything possible should be done to attract capital to establish such factories.

Simultaneously no effort should be spared to assist the cottage hand-loom industry, by organizing co-operation and introducing improved looms.

There is room for hand-weaving on the factory system and on the cottage system.

56. The process of weaving ramie yarn should be examined at the central weaving experimental station. The jails might usefully undertake the working up of plantain fibre.

57. As a preliminary step samples of the local tobacco should
Tobacco. be sent to a manufacturing firm to see whether saleable cigarettes can be made from it.

58. The commercial possibility of a cotton-seed oil industry is
Oil mills. an urgent question, and Government should import an experimental plant yielding an output sufficient to test the capacity of the market. The experiments should be conducted at Cawnpore, independently of any existing ginning mill, and should be arranged for by the Chamber of Commerce.

Delinting of Indian cotton-seed is proved to be practicable. The question of its commercial possibility depends on the market prices of the produce.

59. The development of practically efficient small power plants for oil mills, flour mills, pumping and other purposes should be

taken up as early as possible by the Director of the Industrial department.

60. A list of local firms should be maintained and circulated to purchasing officers, who should be urged to place their orders with local firms as far as possible.

Iron works.

61. Pending the creation of a technological institute experiments on a small scale should be commenced in order to ascertain which of the local trees would give the best "wood pulp" and what woods are suitable for matches. Special attention should be paid to rhea (*acacia leucoploea*) in connection with the possibilities of wood-pulping.

Paper making and matches.

62. The Government might with much advantage to the leather industry encourage the cultivation of babul, rhea, and *cassia auriculata* plantations.

Leather.

63. It is not desirable that the Government should further expand the turpentine industry. Every facility should be given to private enterprise as soon as the Government is satisfied that the supply of raw material can be maintained without injury to grazing interests.

Turpentine.

64. An expert should be obtained to experiment in the manufacture of buttons from bones and horns. The experiment might be carried on at one of the industrial schools.

Buttons.

65. Special enquiries should be made regarding—

Special enquiries.

- (a) the Lyons gold thread industry and the possibility of starting it in this province;
- (b) the manufacture of Kashi silk in Italy and the possibility of starting it in this province;
- (c) the extent to which the perfume industry of the province is suffering from competition by foreign perfumes.

INAUGURAL ADDRESS BY SIR J. P. HEWETT, LIEUTENANT-GOVERNOR, N.W.P. & OUDH.

GENTLEMEN,

We have met together in accordance with the decision announced by this Government in its resolution of the 16th May last that it

would convene a conference to consider how industrial enterprise can best be encouraged in these provinces, and to endeavour to frame a system of industrial education suitable to their needs; and my first duty is to welcome you all and to thank you for your presence here today. The task which we have to enter upon is one of no mean difficulty, and, in order to ensure that our deliberations shall be fruitful of results, I have endeavoured to make the conference as representative as possible. Among those present today are no fewer than ten of the officials of the Local Government who are especially and officially interested in the investigation of these questions. We have the advantage of the presence of four non-official members of the Legislative Council, who will be able to speak with authority as to the needs of the people generally. By the courtesy of the Government of India the Director of the Geological Survey, than whom no one is more interested in the development of the country, is with us. By the courtesy of the Madras Government we have Mr. Chatterton, who has spent many years of his service on the work of improving Indian industries, and whose work we can see reflected in the greatly improved industrial condition of the Madras Presidency. We have Mr. Khan Bahadur Bazonji Dadabhoy, a friend of mine, who manages a cotton mill in Nagpur which is an example to all other cotton mills, and who is familiar with most of the problems connected with the employment of labour in this country. We have as representative of the Chamber of Commerce at Cawnpore, the Manager of a large sugar factory. We have a representative of the Reid Christian College, which has given much attention to commercial education; and—a representative of the Aligarh College, which, as we know, has taken a decided interest in the question of practical as well as literary education. We have a representative of the Bengal and North-Western Railway familiar with the requirements of the large railway workshops in these provinces. We have an Indian capitalist who has not been afraid to put his money into various commercial enterprises in Lucknow. And, lastly, we have a publicist who has given much attention in the newspaper which he edits to the subjects which we have to discuss. I very much regret the absence of Mr. David Yule, the head of the firm of Messrs. Andrew Yule & Co., and of Mr. Hyde, the Superintendent of the Carriage Factory of the Oudh and Rohilkhand Railway. Both these gentlemen had intended to be present at the conference, but both have been called away to England before it began. Mr. T. Smith, Manager of the Allahabad Bank at Cawnpore, has also been prevented at the last moment by press of business from attending. We shall miss their experienced counsel and advice, but I hope that if we all keep our attention strenuously on the

problems we have to consider, we shall find it possible to arrive at some practical conclusions regarding them.

For both branches of our enquiry it is necessary that we should be equipped with information regarding the industries which either exist already or are capable of being established in this province. A number of handy monographs have been from time to time prepared regarding certain of the local arts and industries, but, though they contain much useful information, attention is not sufficiently concentrated in them upon the decline of indigenous industries, and the possibility of reviving them. As long ago as 1888 the Government of India urged the Local Government to complete an industrial survey of the important local industries in the province in order to ascertain their extent, character, and circumstances. The proposal was considered in 1890, and it was then decided that it was not necessary. Although the suggestion was repeated on more than one subsequent occasion it was not thought expedient to carry it out. When I was considering the question of developing industrial enterprise generally, in my capacity of Member of Council in charge of the Department of Commerce and Industry, I was much impressed by our want of knowledge regarding the industries of the country, and, with the approval of His Excellency the Viceroy, I took the opportunity of the discussion on the financial statement for 1906-7 to suggest that the other Local Governments should follow the example of the Madras Government by carrying out an industrial survey. When I became Lieutenant-Governor of these provinces I resolved to lose no time in practising what I had preached, and I entrusted the duty of making the investigation to Mr. A. C. Chatterjee under the general direction of Mr. Moreland, Director of Land Records and Agriculture. The survey is incomplete at present, but you have before you Mr. Chatterjee's "Preliminary Notes on the Industrial Condition and Possibilities of the United Provinces." He has conducted his investigation with intelligence and enthusiasm, and the information collected by him will, I trust, be found by you all to be of great assistance in your consideration of the matters that will come under your notice.

Now there is no province in India in which the extension of industries is more necessary, in the interests of its general population, than the United Provinces. The population of Oudh is 535 to the square mile; it is nearly 100 more per square mile than that of Bengal (438), which comes next in order among the different provinces, while that of Agra, 429, follows very closely and is more than 100 per square mile more than the next, Eastern Bengal and Assam (309). We come second on the list in total population, and (though

of course it would be unwise to rely on the census returns too implicitly), we head the list in the numbers employed in industrial occupations—a number, it may, however, be noted, which was sensibly less in 1901 than it was ten years before. Again, out of 61 of the larger cities in British India no less than 17 are within our boundaries; out of 22 with a population of 100,000 and over, we claim no fewer than 7. So far then as the supply of labour is concerned our conditions both demand, and are favourable to, industrial development. In the way of raw materials we have not, indeed, all the resources that are found in some more favoured provinces. We have no coal, no petroleum, no manganese, no mica, and no precious stones. But, though we have no jute, our vegetable products are large, and we have wide and expansive opportunities in the production of manufactured articles. But we have not utilized the advantages of our position and we are at present a long way behind the leading provinces of the continent in industrial enterprise. The last returns, which I have been able to find, show 429 factories employing 188,106 operatives in Bombay, and 261 factories employing 234,802 operatives in Bengal, and only 154 factories employing 47,809 operatives in this province. We have, roughly speaking, only one operative in every thousand of our population; yet we send a number of operatives every year to the mills of Bombay and Bengal. True, there are some signs of improvement and some grounds for congratulation. The latest figures show that there were 21 more factories at work, and among them a tannery and an oil mill at Cawnpore, and a soap factory and a general mill at Meerut. Our one woollen mill has nearly as many looms and spindles as all the other five mills in India, and our one paper mill holds its own with the other six mills in India in the quality, quantity, and value of its production. But an analysis of the statistics is not very encouraging. Out of the 154 factories, 13 belong to Government or local funds; of the balance no fewer than 97 are cotton ginning, cleaning, and pressing factories, that is factories which prepare raw material for further work in the manufacturing factory. Cotton spinning, weaving, and other mills are 10 in number; leather works, I am sorry to say, number only 3, and oil mills but 1. Further evidence of our backwardness is to be found in the statistics regarding joint stock companies. Out of 17,128 joint stock companies in the country in 1905-6 we could only claim 107. Their paid-up capital amounted to 215 lakhs out of a total of 4,182 lakhs, that is 5 per cent. of the whole; and a very large proportion of this was European capital. The statistics for the past ten years show that we have advanced from 68 companies with a paid-up capital of 127 lakhs to 113 with a capital of 232 lakhs in the year ending 31st March last, while in

the same period the number of joint stock companies in the Madras Presidency has increased from 257 with a capital of 204 lakhs to 528 with a capital of 353 lakhs. It is clear that, in spite of some hopeful signs, we have hardly as yet started on the way towards finding industrial employment, by means of the scientific improvements brought about in the art of manufacture, for the surplus portion of our 48 or 50 millions of population.

The trade of India, the aggregate of which, we should not forget, is every year rapidly increasing, consists at present mainly of the exchange of natural products for artificial products of European manufacture. Agriculture must always remain, as it is now, the chief industry of the country. On it will hinge many—and in provinces situated as the United Provinces are, most—of the manufactures that can be undertaken locally, and on it will depend the power of the agriculturist to purchase manufactures. We have an Agricultural department, not, indeed, as strong as circumstances demand, but strengthened considerably as compared with what it was by the addition of expert advisers. Experiment and research are being encouraged, and at the Agricultural College at Cawnpore revenue officials, land agents, and the sons of landowners receive a modern and scientific education in agriculture. It is in the power of the Agricultural department to help on the development of the country by improving every staple that is grown in it, but the most effective assistance that it can give to commercial enterprise in this province is by improving the quality of the cotton and sugarcane grown within it. The department is, in my judgment, doing splendid work, and I have great hopes it will not be long before it is able to devise improvements of an important character in the cultivation of these two staples. We do not propose at this conference to discuss agricultural questions, and it is not necessary for me to say any more on the subject now except to observe that the export of raw agricultural produce from India must always be large on account of the agricultural character of the country.

It is impossible, however, for any one interested in the industrial development of this country to study the annual trade returns without lamenting that so much valuable raw produce, which might be made up locally, should leave our ports annually to be conveyed to other countries, there to be converted into manufactured articles, and often be reimported into India in that form. I have not the time to refer to the statistics in detail, but I may mention a few figures which are calculated to cause concern. The total exports amount (including over $5\frac{1}{2}$ crores of the precious metals) to over 182 crores;

among the items which attract attention are 2,196 lakhs' worth of cotton; 1,089.75 lakhs' worth of hides and skins, in addition to tanned hides of the value of 445 lakhs; 1,301.95 lakhs' worth of seeds, of which 10 per cent., or 219,537 tons, of the value of over 130 lakhs, were cotton seeds; and 45.9 million pounds of wool of the value of 242.65 lakhs—a progressive record for four years. Mr. Holland will perhaps regret most the continued export of mineral products capable of being worked up locally into manufactured articles, and I certainly share his regret, but I confess that my chief regrets are at present over the enormous export of hides, cotton, and seeds, because these raw products could be so very easily worked up into manufactures in our midst.

The most noticeable features of the imports are that the imports of merchandise amount in all to 108.3 crores. Those interested in the industrial development of these provinces will note that the value of the sugar imported was 873 lakhs—the highest on record; that there was an increase in the value of hardware (total value of imports 266 lakhs), largely due to domestic utensils of copper and brass being replaced in consequence of the dearness of those metals by German and Austrian ware; that the value of woollen manufactures imported was 205 lakhs, that of glass and glassware 121 lakhs, that of cotton yarn and woven and other cotton goods 4,091.7 lakhs, and that of chemicals 68.7 lakhs.

Nevertheless there is a silver lining to the cloud. The exports of Indian articles manufactured or partly manufactured are increasing year by year. In the year ending 31st March last their value increased by 6 per cent. and reached the very respectable figure of 37.84 crores. There is an interesting memorandum in the *Indian Trade Journal* of the 8th instant regarding the invasion of the European market by Indian cotton yarns. The outlook is hopeful for the increase of export of manufactured articles generally, and we in this province should not lose the opportunity of obtaining our proper share in this new field of profit. Upon the question whether the extension of the larger industries involving an extensive use of machinery or the encouragement of the smaller handicrafts is the more likely to help on the development of the country, there is room for two opinions. I confess that I am a follower of those who preach the former doctrine, but, while it is the duty of the State to do all that it can legitimately do to foster the establishment of the larger industries, it is no less its duty to resuscitate and put new life into the arts and handicrafts that still have vitality in them, by reorganizing them on modern lines, and by placing at the disposal of those

engaged in them the practical applications of modern scientific discoveries.

Mr. Chatterjee has collected a great deal of information which goes to show that much can be done in the province to assist the industries connected with textiles and fabrics, that the sugar industry can be developed, that there is a good opening for oil mills and tanneries, and he has made valuable suggestions for consideration in connection with the metal work, woodwork, glass, chemical, and other industries. The facts regarding each industry require careful examination at your hands.

The means by which it is suggested that Government might encourage industrial enterprise are many and varied. It is suggested that Government should itself start pioneer industries and dispose of them to private individuals when the profit-bearing stage is reached—that it should import expert supervisors and skilled workmen for particular industries—that it should build and equip a factory to test the suitability of improved looms and other appliances, and to conduct investigations into improvements in the reeling, winding, warping, and sizing processes of different yarns—that it should start small weaving schools—that it should encourage and assist the adoption and extension of the co-operative principle in every available way, and particularly the extension of co-operative credit so as to relieve handicraftsmen of the incubus of the mahajan—that it should provide advances for the purchase of improved appliances and new tools to be paid for by instalments—that it should arrange for the circulation of information as to markets,—that it should assist the improvement of designs so as to prevent what was well described recently as “the reckless multiple reproduction of stock patterns tending to the ultimate neglect of the markets supplied”—that it should train engine drivers, carpenters, smiths, and fitters—that it should make provision for the dyeing of yarns and other materials in large quantities, and their distribution from central establishments—that it should erect factories to demonstrate Mr. Hadi’s new process for the manufacture of sugar—that it should start small tanning demonstration schools—that it should purchase locally manufactured goods and that it should do many other things to which I need not refer. Among the suggestions that I have enumerated there are undoubtedly many ways in which Government can, and in my opinion should, give encouragement to industrial enterprise; and, so far as lies in my power, I shall do my utmost to give effect to any well considered proposals that this conference may endorse to this end.

I will now turn to the second question with which we have to deal, *viz.* that of providing a proper system of education for those who desire employment in industrial pursuits.

The definition of technical education adopted at the Simla Conference will, I think, serve as a working definition of the system that we should aim at. That definition was "technical education consists of (a) the study of the scientific methods and principles underlying the practice of any handicraft, industry, or profession; and (b) the application of those methods and principles to the practice of the handicraft, industry, or profession in question. The first is the primary or technological aspect of the subject, the second is its subsequent and practical application."

The question of technical and industrial education has been before the Government and the public for over twenty years. There is probably no subject on which more has been written, or said, while less has been accomplished. There has been more than enough of theoretical discussion: what is now required is that we should give to our discussions a practical character. A quarter of a century ago the Education Commission, under whose examination the question of technical education did not come, criticized the general system of education as being directed too much towards proficiency in literary knowledge alone. They proposed the bifurcation of the curriculum in high schools, one course leading to the University and the other designed to fit boys for commercial pursuits. Lord Ripon's Government in 1884, in connection with this recommendation, directed that every variety of study should be encouraged which might serve to direct the attention of the rising generation to industrial and commercial pursuits, but the Government of India did not at that time make any suggestions as to the manner in which technical education should be imparted. A complete examination of the problem was attempted in the able and exhaustive memorandum written in 1886 by Sir Antony MacDonnell, then Secretary to the Government of India in the Home department.

We should not lose sight of the great changes in higher education that have occurred since Sir Antony MacDonnell wrote his memorandum. At that time no steps had been taken in the province to carry out the orders given by Lord Ripon's Government, and the facilities for other than a literary education were limited to small schools of law attached to three of the arts colleges attended by about one hundred students in all, the Thomason College at Rurki attended by 155 students, the Agra Medical School attended by 89 pupils, and 2 industrial schools which were orphanages for

Native Christian children under the charge of missionaries. A University has since been established at Allahabad. In place of 17 arts colleges, attended by about 1,000 students there are now within the province 29 colleges (22 English and 7 Oriental) affiliated to the University either in arts or science or law, or in a combination of these faculties, and attended by nearly 3,000 students. There is a College for Teachers, and it is in contemplation to establish a second. The Agricultural School has recently been converted into a college. Steps are being taken, towards which the Local Government has contributed substantially, for the establishment of a Law College in connection with the University; and we may hope that our Medical College, for which the plans are rapidly approaching completion, will be the first in India, as the Thomason College at Rurki is undoubtedly the first institution for the training of engineers in the country. The province, therefore, either has, or will shortly have, all the facilities necessary for the teaching of those entering the learned and other professions; and in this way it has made great strides in the past twenty years. It has not altogether stood still in the matter of technical education. The Thomason College can now boast its 427 students, and in the last eleven years it has had new classes added to it for training overseers, draftsmen and computers, and mechanical apprentices, besides industrial classes, and technical classes opened last year for the training of foremen and men capable of taking charge of small factories. But these additions to the Thomason College, and the institution of the Industrial School at Lucknow, are the only developments of our educational system directed to the encouragement of industrial education. Moreover, our general system of education has not been modified so as to meet the condition laid down by the Government of India in 1884 that the course of studies should be varied so as to attract boys to industrial and commercial pursuits. The sound system of primary and secondary education, which must be the basis of all solid, technical education, has still to be supplied. As Sir Antony MacDonnell said in paragraph 76 of his memorandum—

At the same time technical instruction must not be considered as something apart and separate from ordinary general education. On the contrary, it should be regarded as a development of such general education. The scheme of general education should therefore be so arranged as, without any break of continuity, to lead up to the instruction which we call "technical."

In one matter, especially,—and that a matter which closely affects technical education—our system of general education seems to be very defective. Sir Antony MacDonnell's proposals contemplated that, at the end of the middle school course a boy looking to art, engineering, commerce, or agriculture as his career, might

pursue a modern curriculum leading to an alternative entrance examination to the University. In September 1890, when Sir Auckland Colvin wrote his Minute on technical education, the establishment of a special examination of a commercial and practical character was under consideration by the University. Eventually in 1892 the University adopted a school final examination, as an alternative entrance examination for those who wished to take modern subjects instead of the classical languages. Then came the Resolution of the Simla Conference to the effect that the school final examination should be separate from the University entrance or matriculation examination, the former to be the termination of a school career, the latter the qualification for a University career. But an entirely different line has been followed in these provinces. I find that in the present year the entrance and school final examinations are to be amalgamated into one matriculation examination, in which English, mathematics, history, and geography remain as before compulsory subjects, and the remaining subjects (a classical language, a second classical language, physics, and chemistry, an Indian vernacular, a modern European language, drawing, agriculture with surveying) may be taken in optional groups of two, one of which must be from the three first mentioned. The scope of the matriculation examination is narrower than that of the two examinations which it has replaced, since it is designed to serve only as a test of fitness for entering upon University studies. In itself it is an improvement on its predecessors for this purpose, but the boy who wishes for a commercial education has been left out in the cold. While the University has provided for its own needs, the case of those who leave school without intending to enter on a University career has been entirely overlooked. I regret very much that a change, of which I disapprove *in toto*, should have to come into force during my first year in these provinces. A committee has recently considered the question, and I intend to lose no time in restoring a school final examination of a practical character, and in ensuring that a certificate of having passed that examination shall be of substantial advantage to a boy when he leaves school. I have no doubt that the University will also recognize this examination. There is no science teaching in middle schools, that in high schools is of a very elementary character, and the teaching of the text books is hardly ever supplemented by what alone can make it of any value, *viz.* practical work on the part of the student. Further, there is no course of commercial teaching, and very little instruction in shorthand and typewriting, in our high schools. In other respects our educational system is distinctly backward and requires to be brought up to date.

At the risk of being tedious I must on this occasion refer in some detail to the various schemes for technical education that have from time to time come under consideration. Sir Antony MacDonnell's proposals were that the prominent features of the preliminary education of those looking to industrial pursuits should be reading, arithmetic, writing, drawing, and elementary science, and that at the end of their middle school course they should either enter schools of technical training or proceed further with the modern curriculum at the high school. It was his idea that in every division or district there should be a technical school, or a technical department of a school, and that they should form an integral part of the educational system of the province. The enquiry conducted in these provinces into the suggestions contained in Sir Antony MacDonnell's memorandum and the resolution of the Government of India of 1888 was conducted by a Committee appointed by Sir Auckland Colvin and resulted in the reorganization of the Thomason College at Rurki and the establishment of the Industrial School at Lucknow, and in the establishment of the Agricultural School (now a college) at Cawnpore and a Teachers' College at Allahabad. The next consideration of the question as affecting these provinces is to be found in the report of Sir Edward Buck in 1901. This was followed by the letter of 20th November 1901 from the Government of India in the Home department, which was issued after the deliberations of the Educational Conference at Simla. The Government of India then insisted that the technical or industrial school must be strictly limited to scientific or technical courses, and that before pupils entered an industrial school they should have been grounded in such subjects as the three "Rs," simple drawing, hand-work, and the elementary principles of natural science. In order to meet the case of pupils who had not, when they entered an industrial school, the due amount of ordinary education, it was suggested that they should be taught in night schools or special classes. With reference to the scheme for industrial schools prepared by the conference, which the Government of India declared to be practicable and complete, they observed—

Briefly, the principles embodied in their conclusions are that industrial schools should be devised to encourage particular local industries or trades; that the best type is the local trade or craft school; that they should be educational, and not commercial, institutions; that in country districts they should be devoted to the study and development of single indigenous products; that in towns they should deal with manufactures, and that several industries may there be collected in one building; that only pupils shall be admitted to a school who intend to practise the trade taught there; that the system of paying pupils to attend such schools should be abandoned, and fees levied where this is advisable without injuring the stability and popularity of the

school; and that grants-in-aid should be given to assist craft schools established by private agency to develop local industries.

In December 1901, the Government of India appointed a committee to visit the different provinces in connection with the institution of industrial schools, and make proposals for carrying into effect the recommendations of the Simla Conference which they had accepted. The report of the committee was not dealt with by the Government of India till the 14th of January 1904. It is not necessary to refer to this committee's proposals at any length. They put forward a series of proposals based upon the principle that industrial instruction in India should be organized upon the model of the Casanova Boy Artizan School at Naples. Rejecting the recommendations of the Simla Conference they contemplated and advised the abolition of industrial schools and the substitution for them of a system of supervision of workshops. The scheme of the committee was discarded—and I think every one will admit rightly discarded—by the Government of India. The Supreme Government, in commending the question to Local Governments, pointed out that two entirely different sets of principles had been put forward, and that nothing had been done to bring either of them to the test of practice. They were of the opinion expressed by several witnesses before the committee that it is impracticable to build up rapidly a great fabric of technical education in India at the present time and that “the matter has not yet passed the stage at which many experiments must be tried and a proportion of failures must be expected.” At the same time they laid down certain broad principles. The first was that a distinction should be made between (i) great industrial centres where capital is employed in the organization of industries on a large scale, and (ii) towns in which local industries are practised as handicrafts in a small private establishment. They suggested that whole-time schools should be set up at centres of industry such as Cawnpore, to which pupils should be admitted after passing as high a standard of general education as could be exacted. They considered that it is only through small industries that any real impression can be made upon the industrial classes of India. They laid it down that the effort of Government was to be confined to producing artizans who will rise to a distinctly higher standard both of general intelligence and of manual skill than can be obtained by the ordinary traditional routine. They considered that the two important objects (i) of keeping up and developing a boy's inherited manual skill and (ii) of giving him a general education which would enlarge his prospects as a craftsman while preventing him from falling into a clerical groove, might be attempted by starting in selected places half-time industrial primary schools, the course of studies in which

should be designed with special reference to teaching that accuracy of workmanship in which Indian artizans are conspicuously deficient, and to familiarizing the pupils with the best designs and processes as applied to their hereditary trade. Geometrical drawing and designing would therefore form an essential part of the course, and the general education given would be determined with reference to the trade. The boy would spend half the day at the primary school and the other half in working as a registered and supervised apprentice under approved artizans who would receive a monetary reward on certain conditions being fulfilled.

The Government of the United Provinces ascertained that the Chamber of Commerce did not consider technical schools to be necessary at Cawnpore. The manufacturers at Hathras were anxious that the Government should establish a school there to turn out men competent to set up, fit, and repair machinery. Such a school would be costly, and it was questionable whether it would be useful. It was therefore determined to expand the Thomason College at Rurki so as to meet the wants of the Cawnpore and Hathras steam users. Sir James LaTouche was advised that industrial schools for local handicrafts would serve no useful purpose because the people either have little to learn or are not willing to learn, and the Government is not in a position to find people competent to teach.

Thus ended the discussions on the subject, and it must be admitted that, though they have travelled far and wide and been extended over nearly a quarter of a century, they have produced little tangible result in this province. As I have already shown the general direction of our system of education is certainly not less purely literary than when the discussions began. It is equally certain that, if it is to meet the requirements of the present day, it must be amended so as to give that variety of study declared by the Government of India more than twenty years ago to be essential in order to attract young men to commercial and industrial pursuits. It is difficult to disentangle from the discussions any set of principles to guide us, and it would be certainly presumptuous for me to attempt to formulate any. But it does seem to me to be an axiom that there is a very close connection between education and the progress of industries and trade. Undoubtedly this truth has not been sufficiently recognized in India, and to my mind its backwardness in industries and trade is largely due to the failure to recognize the importance of organizing on a proper basis its system of education.

In order to assist you in your deliberations, and with a view to focus discussion on practical issues, I have had a note prepared

by Mr. Butler, who has carried out his task in an admirable manner, showing the present state of the question in this province and elsewhere, and formulating definite proposals on the basis of experience and experiment in India and in other countries. I must ask you to understand clearly that my object in so doing was not in any way to limit the range of your discussion, still less to suggest conclusions, but simply and solely to extract some definite issues for you to consider at the commencement of your labours. The subject is so wide, the literature is so copious, that without some such precipitation of ideas much of your valuable time might have been wasted.

In the note referred to three propositions are laid down as axioms, *viz.*—

- (1) technical work must be connected with a local industry and have a definite object:
- (2) the teacher should be a practical expert and be given a free hand; in scientific branches he should be an investigator and have time for research; in the manipulative branches he should have been in works: and
- (3) money must be spent freely on experimental work, and in keeping up-to-date all apparatus, tools, plant, and appliances.

These propositions are, it seems to me, very sound, but, though referred to as axioms, it is not intended that they should not come under discussion or be subjected to modification and improvement, and one of your first duties will be to consider them.

The consideration of the question whether a technological institute should be established in the province must necessarily come first in the educational reforms to be discussed. The history of the development of technical education in other countries favours this order of evolution, and reason dictates that our first duty is to meet the wants of those who are the most educated of the community. One of the main features of the scheme outlined by Sir Antony MacDonnell was that all industrial schools should be linked to a central institution, "which should be the highest embodiment of instruction in the particular art or industry with which the school is concerned." He contemplated that this central institution should "not only direct and control the teachings of the schools scattered throughout the province, but inspire them with new ideas and furnish them with good designs." He wrote—

Even at the risk of repetition and prolixity the present writer would most strongly urge the view, which is, indeed, confirmed by the experience we have had upon this question, that no system of industrial schools can

possibly work in India which does not proceed upon the principle that all technical schools of a particular class shall depend on and be subordinate to a central institution..... The central institution, whether we call it a school of art, or a science and art department, should gather up in itself all that is best in the artistic and industrial traditions and workmanship of the province, and it should be enabled to attract to itself by stipends and scholarships all prominent pupils, some of whom would doubtless adopt the profession of a teacher. The central institution should decide, in communication with local boards, District Officers, and Directors of Agriculture and Commerce, when a particular industry in a particular place needed encouragement and training, and the expense of the school then established might reasonably be in whole or in part a charge on local funds.

Unlike the other large provinces we have no school of art or central institution which would correspond to that which Sir Antony MacDonnell had in his mind's eye, and which might be aptly described as a "technological institute." I have no hesitation in giving my humble support to the view put forward by one of the most distinguished Lieutenant-Governors of these provinces, that unless we do arrange that our industrial schools shall be co-ordinated with a central institution of the nature of a technological institute, we may make up our minds at once that our labours will be in vain. The final recommendation at the Simla Conference regarding technical and industrial education was that in provinces where the suggested developments admit of wide or rapid growth, it should be for the consideration of Local Governments whether a separate technological department of Government may in time be instituted for their special supervision and control. Not only is a technological institute required for the control of any system of industrial schools that can be devised, but it is also necessary for the purpose of commercial research. It is essential that investigations should be continuously directed towards increasing our knowledge as to the use of our vegetable and mineral products. In the laboratory of the Geological Survey in Calcutta the problem is attacked as regards our mineral products, but we in these provinces unfortunately have but little direct interest in the researches over which Mr. Holland so ably presides. We are, however, intensely interested in all forms of research concerned with the utilization of vegetable products and the Reporter of Economic Products seems to us a little far away. We want, I think, some local authority, or authorities, who will themselves conduct research and supervise the investigations of these matters in different parts of the province. The institute, in which these authorities would be located, should be in close communication with the great factories of the province, so as to ensure that mutual aid shall be given by the work in the institute and those employed in the management of the factories. Cawnpore naturally suggests itself as the best locality for a technological institute.

A variety of different institutions in furtherance of technical education have been started in other provinces, beginning with those at the top of the scale, such as the College of Science at Poona and the Victoria Jubilee Technical Institute at Bombay, and coming down to the more humble weaving schools and classes for weavers to be found in some provinces. In the note which you have received is outlined a scheme for manual schools, for technical schools where required, and for a system of training for boys in secondary schools. I do not feel competent to enter into the details of this scheme, but I must say that two points about it do appear to me to be very sound, *viz.*, that if you do start manual schools you should place them under expert head masters, and that in all technical institutions students should be given scholarships freely on the strict condition that they will engage to follow the occupation in which they are trained.

Personally I do not feel sure that we should be right to accept the view that in this country the proper training school for workmen in the large industries employing machinery is the factory. It is undoubtedly the case in the West. There the ambitious workmen are able to improve their education in evening or Sunday schools. Here, if any ambitious workman exists, he has seldom an opportunity for improving his education. School classes held when a mill is closed or with the permission of the mill owners, may—probably will—attract the more intelligent workmen. But it seems to me that we have to go a step further back, and begin by trying to make the mill operatives ambitious at all. It is admitted that the mill population is growing up entirely uneducated. One experienced manager of a cotton mill in these provinces, speaking at the Industrial Conference at Benares in 1905, said—

Go where you will and search where you may, you will find everywhere the same complaint, and that is the poor quality of labour. And it is poor because the labouring man is not thrifty. He only values money for whatever it can give him at the moment. He does not value work for work's sake. To him it is unfortunately a matter of complete indifference whether his work is bad or good. He does not value time, because his practice is not to do as much as possible in a given time, but as little as possible.

One of the leading merchants in Calcutta writes to me as follows:—

Keep in mind, however, the good old British system of apprenticeship, which ensures a boy mastering his craft and, generally, loving it too. The Indian people don't go to work in the mills for the love of the thing, but to make a living. I have spent thirty-three years inside mills here, but not one Indian has suggested an improvement in machinery or treatment of raw material. Such a state of things would be impossible in Britain. The

workman there is very low down in the scale who does not plan and think out schemes to make his tools more effective.

Mr. Chatterjee has noticed the low intellectual standard of the handloom weavers, and advocates "a very wide extension of primary education among the weaving classes."

I feel myself very strongly that we must recognize that our craftsmen, workmen, and artizans ought to receive some education, and that the first principle to be followed in our scheme for industrial development should be that they must be better equipped in the future for their work than they have been in the past.

I confess too, though I know that here also I am opposing myself to the opinion of some who have more practical experience, that my own inclination is towards the view that the training of foremen for the large industries employing machinery should begin by the study of theory, and should be completed by practical work in the factory or mill rather than follow the opposite course. I am no believer in supplying the want of a good education for the overseer and the foreman by attendance at evening classes when the strain of work throughout the day in the mill will have left him weary and incapable of assimilating what he has been taught. And I am so convinced that a good working knowledge of English is essential for the foreman or overseer dealing with operatives employed on intricate machinery that I cannot regard any system under which he would enter the factory without this knowledge as satisfactory.

For the training of workmen in local industries many suggestions are made in Mr. Chatterjee's report. These include cotton and silk weaving schools, schools of design for weavers in cotton and silk, schools for dyeing, tanning, glass-blowing, carpentry, and general design, and for drawing and design for metal work. I do not propose at the present stage to express any opinion as to the individual proposals made by Mr. Chatterjee, but my general impression is that schools such as he suggests must be beneficial to the industries referred to, and are, in fact, essential if the industries are to reach or maintain a substantial level of success. Some, however, of these matters which he would have taught or investigated at such schools should come within the sphere of influence of the technological institute.

I am afraid, gentlemen, that much that I have said cannot claim to be original, but it was difficult to state the case without reproducing facts and figures which are no doubt familiar to all my audience.

The outstanding facts are that we have in these provinces a super-abundant population already in the province of Agra more collected in towns than it is in other parts of India; that we have abundant raw agricultural produce capable of being worked up locally into manufactured articles, but that instead of being so worked up it is exported for manufacture elsewhere; that there are a number of industries which, given the requisite capital and the requisite training of the workmen and overseers, could easily be worked at a substantial profit, and that, in order to effectually work these industries we require to make substantial changes in and additions to the existing system of education. But if the Government does its part, if it trains up skilled workmen and foremen capable of managing industrial businesses, the people must do their part, they must make up their minds to invest their capital in the development of the country. If the youth of the country is trained up for industrial employment, and, after they have been trained, it is found that there is no employment for them, the last state of things will be worse than the first. Government cannot do everything. The main effort must be made by the people themselves. I have before, in addressing the Governor-General's Council on the financial statement of last year, urged that there is room for both European and Indian capital. I have shown in my previous remarks that capital in the province is as yet shy and timid of joint stock companies. There are signs of improvement in this respect and these signs are very encouraging. Our co-operative credit societies are doing much good, and will, I think, convince people that it is more profitable to invest rather than to hoard money. After the Industrial Conference at Allahabad a move was made to raise money for the United Provinces Pioneer Sugar Mill Company. I don't know how this has proceeded, but I hope the capital has been successfully raised. In connection with Mr. Sherring's experiments with the handloom at Bara Banki, I am glad to learn that the Talukdars of Oudh are ready to advance money to assist enterprises of the kind. The results published only a few days ago of the working of the co-operative society for the production of silk goods at Benares show a substantial profit of 7 per cent.

Gentlemen, when I began my address I said that the problem before us was no light one. It is equally certain that it is of the utmost importance to this country that every effort should be made to solve it without delay. In no country that I know of have the conditions now existing in India ever presented themselves before. We have a large and expanding railway system; we have four or five great centres of industry which would compare favourably with many of the industrial centres of Europe; we have the richest possible collection of mineral and vegetable products; we have a foreign trade

of nearly 212 millions sterling, much of which consists in the export of our valuable raw products in return for manufactured articles made in the United Kingdom and foreign countries. In certain of our ports you might imagine yourself in one of the bustling cities of Europe. Take a few miles' journey into the interior of the country, and you will see hardly any signs of industrial enterprise, and will at once recognize that you are in a country the inhabitants of which are far too much dependent on a single industry, *viz.* agriculture. For such a condition of things we can find no precedent, and it is vain to look for precedent in our efforts to remedy it. Two problems set themselves palpably before us. First, we must educate people so as to divert their energies to industrial pursuits other than agricultural. We must educate skilled labour for all our industries. We must develop among our workmen an interest in their work to replace the feeling that the day's work is only done for the day's wage; and we must bring up educated foremen, supervisors, and managers. We must encourage research into the potential value of our raw produce. Secondly, we must endeavour to overcome the shyness of capital, and success in this respect cannot be achieved unless the leaders of the people throw themselves enthusiastically into the work.

We have now to consider on the facts that will be laid before us what principles we can and should adopt. I have no fear that you will shrink from your responsibilities as the most representative body hitherto assembled in India to grapple with these weighty problems. I have no fear that you will be timid in experiment or fearful of risk where novel conditions must be dealt with, or shackled by precedent where no true precedent exists. I have no fear that you will accept past failure without investigating its causes to see if they cannot be removed. For my part I consider that the object to be gained is worth a heavy sacrifice. I confess that my imagination is powerfully affected by the opportunities of the present occasion. We cannot regulate the sunshine and the shower, the seed-time and the harvest; that is beyond the power of man. But we can control, to some extent we can control, the disposal of the products of the earth, thereby opening new avenues to employment and spreading greater prosperity over the land. We may make some mistakes; may spend some money unprofitably; but I am confident that we are entering to-day on labours which will not be in vain.

APPENDICES

PAPERS CONNECTED WITH SIR E. C. BUCK'S REPORT

APPENDIX I

General conclusions of the Commissioners appointed to inquire as to what form of manual and practical instruction should be included in the Educational system of Primary Schools under the Board of National Education in Ireland, and the grounds on which those conclusions are based.

[Members of the Irish Commission visited the principal schools in Norway, Denmark, Germany, France, Switzerland and Holland. The conclusions summarized below are based on the systems and practices ascertained in their Continental tours.]

I. KINDERGARTEN.—We are of opinion that the general principles and methods of the system known by the name of Kindergarten, which have been already introduced into some of the schools under the National Education Board, should be extended to all schools attended by infant children.

II. EDUCATIONAL HANDWORK.—We think that Kindergarten methods and principles should be continued in Classes I, II and III of ordinary schools, in the form of Paper-folding, Cardboard work, Wire work, Brick-laying, Clay-modelling, and such like exercises. These exercises we include under the general term of *Hand and Eye Training*, and we look upon them as of great importance, for the purpose of carrying on the manual training of the children, from the Kindergarten stage to the higher grades of Manual Instruction. Further, we consider that some form of more advanced Manual Instruction should be introduced, as far as possible, in the higher classes of schools for boys; and we recommend, as most suitable, for this purpose instruction in the principles and practice of *Woodwork*, treated educationally. The object to be aimed at is not to make the boys carpenters, but to train them in habits of accurate observation, careful measurement, and exact workmanship. Such habits we regard as of great value to all boys, whatever may be their subsequent career in life.

III. DRAWING.—We recommend that Drawing should be made compulsory; as far as possible, in all National Schools. The first elements of it find a place in the Kindergarten system, and it should be continued, we think, to the end of the school career. In the classes above the Kindergarten, it should be associated with Hand and Eye Training, with Woodwork and to some extent also with Elementary Science, as soon as these subjects are introduced.

IV. ELEMENTARY SCIENCE.—We are of opinion that a simple course of Elementary Science should form a part of ordinary education in National Schools. This course should be so framed as to bring home to the minds of the children an intelligent knowledge of the common facts of nature, and the rudimentary principles of science. In the lower classes, it should consist in great part of object lessons, and in the higher classes, it should be illustrated by simple experiments. The pupils should be encouraged and assisted, as far

as may be found practicable, to take part in the experiments. The programme for this course, while following everywhere the same general lines, may with advantage be varied in its details, according to the circumstances of the locality, and the character and condition of the children.

V. AGRICULTURE.—We do not think that Agriculture as an art, that is to say, practical farming, is a subject that properly belongs to elementary education. At present, the study or what is called the Theory of Agriculture, is compulsory for boys in all rural schools, and is highly encouraged by fees. But our inquiry has shown that this study consists, for the most part, in committing a text-book to memory; and we have come to the conclusion that it has little educational or practical value. We recommend instead, that the course of Elementary Science to be taught in rural schools; should be so framed as to illustrate the more simple scientific principles that underlie the art and industry of Agriculture. We also recommend the maintenance and extension of School Gardens, as a means by which these scientific principles may be illustrated and made interesting to the pupils. On the other hand, we do not consider that the maintenance of School Farms, the object of which is to teach the art of Agriculture, properly belongs to the functions of a Board of primary education. As regards the Model Farm at Glasnevin, and the Munster Dairy School, we think that they could be made more useful for the purposes of agricultural education, if placed in charge of an Agricultural Department, whenever such a Department is established in Ireland.

VI. COOKERY, LAUNDRY WORK, AND DOMESTIC SCIENCE.—We think it very desirable that Cookery, Laundry Work, and Domestic Science, should be taught, as far as may be found practicable, in girls' schools. We cannot advise that these subjects should, at present, be made compulsory; but we do recommend that aid should be freely given to provide the necessary buildings and equipment for teaching them; and that managers and teachers should be encouraged to take them up, by a liberal system of grants.

VII. NEEDLEWORK.—Needlework should continue to form, as at present, an important element in all schools for girls. The first elements of it are taught in the Kindergarten system. It should be continued in Classes I, II and III, as a part of Hand and Eye Training; and, in the higher classes, advanced Needlework will naturally occupy the time devoted to Woodwork in schools for boys.

VIII. SINGING.—We recommend that Singing should be brought within the reach, as far as possible, of all the children attending National Schools in Ireland. It has a cultivating and refining influence, and furnishes a source of permanent enjoyment. In England and Scotland, the number of children who are taught Singing, in schools inspected by the State, is about 99 per cent. of the number in average attendance; and we see no reason why an equally good result should not be attained in Ireland, if equal encouragement be given. From the experience of English and Scotch schools, it seems clear that the Tonic Sol-fa method of teaching is the most simple and effective. This system has been already adopted in some Irish schools; and we strongly recommend that it be extended as rapidly and widely as may be found possible.

IX. DRILL AND PHYSICAL EXERCISES.—Various kinds of Drill and Physical Exercises are now a recognised part of primary education in England, in Scotland, and on the Continent of Europe; and we think they should be introduced into the primary schools of Ireland, with the least possible delay,

We are satisfied, from what we have seen and heard on this subject, that such exercises contribute largely to the health, the spirits, and the general well-being of the children. They are no additional burden on school life, but rather a pleasant form of recreation; and the children return from them to their studies with renewed energy.

It will be for the Commissioners of National Education to consider and determine in what manner these various changes can best be introduced into their system. But we have ventured to make some general suggestions on this head, which it may be well to set forth here in a summary form.

We think that the changes recommended ought to be introduced, not all at once, but gradually and tentatively. They should be tried first in the larger centres, and afterwards extended to more remote districts. It would be necessary, at the outset, to engage the services of experts, from outside the present staff of the National Education Board, whose duty it would be to organise the classes, and to aid the teachers with their counsel and instruction. But we have no doubt that this work, after a little time, could be taken up by the ordinary staff of the Board. Again, it is obviously important that all future teachers should be trained in the new subjects; and the programme of the Training Colleges must accordingly be framed to this end with as little delay as possible.

We have carefully considered the question, by what means time may be found for the several exercises in manual and practical training which we have recommended; and we have pointed out certain modifications in the present programme of studies, which may be adopted for that purpose, and which, we believe, will not interfere unfavourably with the course of instruction hitherto given in the National Schools.

Lastly, we are strongly of opinion that the system of Results Fees, depending on the individual examination of pupils, at present in force in the National Schools, ought not to be applied to these subjects of Manual and Practical Instruction. While it should be always open to the Inspector to examine individual pupils, we think that the grants awarded to the teacher, in these subjects, should largely depend on the general evidence of his own zeal and industry, on the efficiency of his method of teaching, and on his power to arrest and hold the attention of his class.

The considerations by which we have been led to the general conclusions above set out, will be fully discussed in the second part of this Report, under the several heads of Manual and Practical Instruction. But we think it will be for Your Excellency's convenience, that the general summary of our conclusions should be here followed by a general summary of the grounds on which they are based.

I. First, then, there are reasons founded on educational principles. The present system, which consists largely in the study of books, is one-sided in its character; and it leaves some of the most useful faculties of the mind absolutely untrained. We think it important that children should be taught not merely to take in knowledge from books, but to observe with intelligence the material world around them; that they should be trained in habits of correct reasoning on the facts observed; and that they should, even at school, acquire

some skill in the use of hand and eye to execute the conceptions of the brain. Such a training we regard as valuable to all, but especially valuable to those whose lives are to be mainly devoted to industrial arts and occupations. The great bulk of the pupils attending primary schools under the National Board, will have to earn their bread by the work of their hands; it is, therefore, important that they should be trained, from the beginning, to use their hands with dexterity and intelligence.¹

II. Next we have the practical experience of those schools in England, Scotland, and on the Continent of Europe, in which such a system as we recommend has been already introduced and tested. The evidence we have received on this point is absolutely unanimous and, as we think, entirely conclusive. We have been told, over and over again, that the introduction of manual and practical training has contributed greatly to stimulate the intelligence of the pupils, to increase their interest in school work, and to make school life generally brighter and more pleasant. As a consequence, the school attendance is improved, the children remain at school to a more advanced age; and much time is gained for the purpose of education.

We inquired particularly whether the literary side of school studies—reading, writing, arithmetic, grammar, and geography—had suffered any loss by the change; and the answer was uniform, that no such loss had been observed. In some cases, we were assured that the literary studies had been positively improved by the introduction of manual training. This result was accounted for, partly by the increased intelligence of the children, partly by the constant change and variety of the occupations,—many of the most useful exercises being only a kind of organised play—and partly by their increased interest in their work.

We regard it also as a very significant testimony to the value of manual training, that wherever it has been once introduced, it has, with hardly any exception, been continued and extended. There has been practically no disposition to go back to the old system, which made primary education almost exclusively literary in its character; and after an experience extending over some years, there is a general consensus of managers of schools, inspectors, and parents, that the value of primary education has been greatly enhanced by the change.²

¹The general educational value of Manual Training in primary schools, especially for those who have to devote their lives to manual work, has been insisted on by a great number of witnesses. The following may be taken as examples: *Mr. A. W. Bevis*, Director of Manual Training to the Birmingham School Board, vol. ii., qq. 3134-7; *Mr. George H. Robinson*, Head Master, Board School, Birmingham, vol. ii., qq. 3584-90; *Sir Philip Magnus*, City and Guilds of London Institute, vol. ii., qq. 4167, 4220-1; *Mr. T. G. Rooper*, H.M. Inspector of Schools in England, vol. ii., qq. 5136-41; *Mr. Solomon Barter*, Organiser of Manual Instruction to the London School Board, vol. i., qq. 4928-34; *Mr. Edmund Morris*, Instructor in Woodwork to the Barrow-in-Furness School Board, vol. ii., qq. 10448-8A; *Mr. Arnold Graves*, Honorary Secretary to the Technical Education Association for Ireland, vol. iii., q. 10692; *Mr. S. M'C. Murray*, Head Master, Sciennes Public Schools, Edinburgh, vol. iv., qq. 22199-204; *Mr. J. G. Kerr*, Head Master, Allan Glen's School, Glasgow, vol. iv., qq. 23532-40.

²The testimony by which the statements made in the three paragraphs of the above section are supported, permeates the whole body of the evidence

III. Lastly, there is a consideration of a practical character, which seems A basis needed for to us deserving of no little weight. A strong desire exists technical Education. throughout this country, and it is growing stronger every

we have taken in England and Scotland; and it cannot be adequately represented by isolated citations. Nevertheless we think it may be well to subjoin here a few references to particular passages of the evidence, which may be taken as typical examples of what we have everywhere heard:—

(1) INCREASED INTELLIGENCE OF THE PUPILS.—*Mr. George H. Robinson*, Head Master, Board School, Birmingham, vol. ii., qq. 3487, 3497; *Hon. E. Lyulph Stanley*, Member of the London School Board, vol. ii., qq. 4402-3; *Mr. J. R. Diggle*, formerly Chairman of the London School Board, vol. ii., q. 4792; *Rev. G. D. Du Port*, H.M. Chief Inspector of Schools in England, vol. ii., qq. 5418-19; *Mr. C. A. Buckmaster*, Senior Inspector of Schools under the Science and Art Department, vol. ii., q. 5589; *Mr. Alfred Perceval Graves*, H.M. Inspector of Schools in England, vol. ii., qq. 6192-4; *Sir Joshua Fitch*, formerly H.M. Chief Inspector of Training Colleges in England, vol. ii., q. 6517; *Mr. Edward M. Hance*, Clerk to the Liverpool School Board, vol. ii., q. 7199; *Mr. Jerome Wallace*, Teacher, Harlaw Public School, Canonbie, vol. iv., qq. 21537-8; *Mr. Robert Calder*, H.M. Inspector of Schools in Scotland, vol. iv., qq. 23899-904.

(2) GREATER INTEREST IN SCHOOL WORK, IMPROVED ATTENDANCE AND LONGER TIME AT SCHOOL.—*Mr. George H. Robinson*, Head Master, Board School, Birmingham, vol. ii., q. 3493; *Sir Philip Magnus*, City and Guilds of London Institute, vol. ii., q. 4170; *Hon. E. Lyulph Stanley*, Member of the London School Board, vol. ii., qq. 4464-5; *Mr. J. R. Diggle*, formerly Chairman of the London School Board, vol. ii., qq. 4577-82; *Mr. William Oulton*, Vice-Chairman of the Liverpool School Board, vol. ii., qq. 6932-4, 7000-5; *Mr. Edward M. Hance*, Clerk to the Liverpool School Board, vol. ii., qq. 7896-8, 7238, 7302-3; *Mr. A. F. Bott*, Senior Inspector of Schools to the Liverpool School Board, vol. ii., q. 7693; *Dr. J. H. Gladstone*, F.R.S., formerly Member of the London School Board, vol. ii., q. 9923.

(3) LITERARY STUDIES HAVE NOT SUFFERED.—*Mr. John Taylor*, Head Master, Board School, Birmingham, vol. ii., qq. 3695-700; *Sir Philip Magnus*, City and Guilds of London Institute, vol. ii., q. 4172; *Hon. E. Lyulph Stanley*, Member of the London School Board, vol. ii., q. 4471; *Mr. William Oulton*, Vice-Chairman of the Liverpool School Board, vol. ii., qq. 7059-68; *Mr. Edward M. Hance*, Clerk to the Liverpool School Board, vol. ii., qq. 7199, 7267; *Mr. J. C. Pearson*, Director of Manual Instruction to the Liverpool School Board, vol. ii., qq. 8079-80; *Mr. Colin G. Macrae*, Chairman of the Edinburgh School Board, vol. iv., qq. 21882-5, 21901-8; *Mr. A. E. Scougal*, H.M. Inspector of Schools in Scotland, vol. iv., qq. 22673-7; *Mr. G. W. Alexander*, Clerk to the Glasgow School Board, vol. iv., qq. 23219-22.

(4) MANUAL TRAINING, ONCE INTRODUCED, WAS FOUND USEFUL, TOOK ROOT AND DEVELOPED, AND BECAME POPULAR.—*Mr. A. W. Bevis*, Director of Manual Training to Birmingham School Board, vol. ii., q. 3159; *Mr. John Taylor*, Head Master, Board School, Birmingham, vol. ii., qq. 3693-4, 3725-38; *Sir Philip Magnus*, City and Guilds of London Institute, vol. ii., q. 4167; *Hon. E. Lyulph Stanley*, Member of the London School Board, vol. ii., q. 4489; *Mr. T. G. Rooper*, H.M. Inspector of Schools in England, vol. ii., qq. 5034, 5130, 5138-45; *Rev. D. C. Du Port*, H.M. Chief Inspector of Schools in England, vol. ii., qq. 5408-16;

day, for the introduction of a general system of Technical Education. It is thought that a good system of Technical Education would contribute largely towards the development of arts and industries in Ireland; and in this opinion we entirely concur. But the present system of primary education is so one-sided in its character that it leaves the pupils quite unprepared for Technical Education. The clever boys trained in the National Schools, if they are disposed to seek for a higher education, may pass with advantage into Intermediate Schools of the kind now general in Ireland; but they are not fit to enter a Technical School, even if they had such a school at their doors. Now it seems to us that the changes we recommend would go far to remedy this defect. The system of National Education, modified as we propose, would give an all-round training to the faculties of the children, and would thus lay a solid foundation for any system of higher education—literary, scientific, or technical—which might afterwards be found suitable to their talents and their circumstances.¹

(from pre-page)

Mr. John Cooke, Hon.-Secretary, Sloyd Association for Great Britain and Ireland, vol. ii., qq. 5619-27; *Mrs. Homan*, Member of the London School Board, vol. ii., qq. 6357-60; *Mr. William Oulton*, Vice-Chairman of the Liverpool School Board, vol. ii., qq. 6903, 6949-58, 7019; *Mr. A. T. Bott*, Senior Inspector of Schools to the Liverpool School Board, vol. ii., qq. 7593-603; *Mr. William Nelson*, Superintendent of Manual Instruction to the Manchester School Board, vol. ii., q. 8599; *Mr. A. E. Scougal*, H.M. Inspector of Schools in Scotland, vol. iv., qq. 22576-83; *Sir James Low*, formerly Lord Provost of Dundee, vol. iv., qq. 23743-7.

(5) GENERAL EVIDENCE INCLUDING TWO OR MORE OF THE ABOVE HEADS.—*Sir Joshua Fitch*, formerly H.M. Chief Inspector of Training Colleges in England, vol. ii., qq. 6493-99, 6543-46; *Mr. Solomon Barter*, Organizer of Manual Instruction to the London School Board, vol. ii., qq. 4832-37; *Mr. Arthur Hawcridge*, Superintendent of Schools to Barrow-in-Furness School Board, vol. ii., qq. 10282-95; *Mr. Colin G. Macrae*, Chairman of the Edinburgh School Board, vol. iv., qq. 21825-35, 21739-49, 21753-70; *Mr. S. M'C. Murray*, Head Master, Sciennes Public School, Edinburgh, vol. iv., qq. 22142-8, 22205-11, 22264-79; *Sir John Cuthbertson*, Chairman of the Glasgow School Board, vol. iv., qq. 22996, 23109-14; *Mr. J. G. Kerr*, Head Master, Allan Glen's School, Glasgow, vol. iv., qq. 23512-23; *Mr. G. J. Tarbut*, Head Master, Continuation School, Dundee, vol. iv., qq. 23963-70.

¹Many witnesses, in the course of their evidence, have incidentally pointed out the necessity of Manual and Practical Instruction in primary schools, as a basis for Technical Education. For example:—*Professor H. E. Armstrong*, City and Guilds of London Institute, vol. ii., qq. 3795-6; *Mr. J. R. Diggle*, formerly Chairman of the London School Board, vol. ii., qq. 4650-61; *Mr. Solomon Barter*, Organizer of Manual Instruction to the London School Board, vol. ii., q. 4838; *Mr. William Oulton*, Vice-Chairman of the Liverpool School Board, vol. ii., q. 6931; *Rev. Brother Thomas*, Principal, De La Salle Training College, vol. iv., q. 14277; *Rev. P. Lally*, Honorary Secretary, Galway Technical School, vol. iv., qq. 17039-42; *Mr. James Perry*, County Surveyor of Galway, vol. iv., qq. 17291-301; *Mr. Colin G. Macrae*, Chairman of the Edinburgh School Board, vol. iv., qq. 21843-4; *Sir John Cuthbertson*, Chairman of the Glasgow School Board, vol. iv., qq. 23067-9; *Sir James Low*, formerly Lord Provost of Dundee, vol. iv., qq. 23711-14; *Professor Hartley*, F.R.S., College of Science, Dublin, vol. iv., qq. 26248-51, 26323-4.

APPENDIX II

Position of Practical Education In Each Province

Bengal.—Shortly after 1897, the Educational Department of Bengal passed from the hands of an able representative of the literary school into those of a Director whose career had been connected with practical science. The outgoing Director had not been in full sympathy with the views and principles to which expression was given in the Resolutions of 1895 and 1897, while his successor gave them warm support. The accession of the latter to the office coincided with instructions by the Lieutenant-Governor to convene a Committee for the framing of recommendations on the basis of the principles enunciated in the Imperial Resolutions. A Committee was formed of educational experts (chiefly natives), who in 1899 submitted a scheme for the reform of primary education which, although independently worked out, presented, as noted by Sir John Woodburn, remarkable coincidence with the Irish scheme and included, as in the case of Ireland, proposals that educational handwork and manual training should be compulsory. The Bengal report was published for general information and free criticism invited. "The call was," writes the Lieutenant-Governor, "widely responded to, numerous representations from public bodies were received, and the newspapers commented at length on the scheme. The criticisms on the whole were not unfavourable."

2. A new Committee was then formed and a revised scheme submitted, which was formally accepted by the Local Government in a Resolution published in the *Calcutta Gazette* of the 1st January 1901. The only important change made in the revised scheme was that manual training should be optional, not compulsory; Kindergarten methods, drawing, object lessons, elementary science, physical training remained obligatory.

3. **Central Provinces.**—The Province in which, after Bengal, it is most easy to ascertain the present position and future intentions is the *Central Provinces*. The reason is that a few years ago Sir Alexander Mackenzie introduced a system very like that advocated by the Irish Commissioners too suddenly into all classes of schools. The scheme was based on sound principles but failed, partly because the educational methods were too elaborate and too costly. This circumstance led to the appointment of a Committee under Mr. Fuller for the preparation of something like a definite plan which was to be worked up to gradually and cautiously. The Central Provinces population is essentially agricultural—excellent arrangements were made for the rapid and effectual training of teachers for rural schools, and definite rules laid down for providing agricultural children with instruction suitable to their future occupation. These will be explained more fully in the chapter on agricultural instruction. Educational handwork and manual training were rightly eliminated for the present from the country schools, but maintained in the towns which supply the craftsmen and more highly educated classes of the Province. It is true that some of the reforms suggested in the 1897 Resolution were not formally introduced into the Central Provinces curricula, but practice coincides with them, and the Educational Code is now to be brought into accordance with practice.

4. **Bombay.**—As was acknowledged in 1897 [Revenue and Agricultural Department letter No. 729 of 18th May 1897], the Educational Department of

Bombay has made exceptional progress in the introduction of practical methods into primary and secondary schools, but as Mr. Giles' statement shows, much is left to be done, and the question still remains whether science holds a sufficiently prominent place in the curricula. Educational handwork and manual training await the instruction of teachers, and agricultural readers are not yet prepared.

5. In *Madras*, as in *Bombay*, the Resolution of 1897 has not yet received consideration. The educational system in this Presidency differs widely from that in other parts of India, in that general education is more widely spread; that the schools are chiefly aided, and not Government, schools; and that the curricula are based on a scheme of examinations. The 'working plan' is sketched, though somewhat imperfectly, in the introduction to the Departmental Calendar [*Commissioners for Government Examinations*, 1899-1900], in which chief stress is laid on the suitability of each course for the provision of Government officials of various classes. Object lessons, elementary and advanced science, and drawing are optional subjects, though encouraged by grants. ["With a view to supply this want, the Director proposes gradually to make instruction in Kindergarten methods compulsory in all practising schools managed by the Department, and to require the students under training to devote special attention to the matter. The paltry assignment which alone it has been found possible to make to 'results schools' has led to the neglect of the teaching of optional subjects generally in such schools; and it was partly with a view to eradicate this evil that the important changes in the Grant-in-Aid Code, now under consideration of Government, were recommended by the recent Conference." (*Paragraph 183, Cotton's Report.*)] Educational handwork and manual training are advocated. ["Every opportunity is taken to impress upon heads of institutions the paramount importance of manual training. But it is difficult to get managers of schools and parents of pupils to realise the purpose which it is intended and fitted to serve in the school curriculum. They look upon the time devoted to this subject as so much deducted from the time which belongs to ordinary book-subjects, and therefore as a hindrance to a boy's chances of passing one or other of the public examinations, success in which is regarded as of more importance than the education which leads up to them. (*Paragraph 184, Cotton's Report.*)] But their introduction is delayed for want of teachers.

6. Scientific and technical subjects are further encouraged by special examinations which were designed to 'have a great effect on the minds of the rising generation, and would tend more than anything else to divert the minds of students from the literary bent which at present consumes all their energies'. No less than one hundred and eighty-nine subjects are now brought under examination embracing engineering in its various branches, physical and other sciences, drawing, and all manner of trades.

7. I was informed that the system had broken down. This result might have been expected. The subjects are all optional, and few students could be expected to take them up while 'examination' in practical trades is an anomaly. The object in view would be much more satisfactorily obtained by accepting the policy of the Imperial Resolutions in introducing practical methods and compulsory instruction in drawing and science into the general educational scheme than by adopting this abnormal system of separate and optional examinations.

8. In the *North-Western Provinces and Oudh*, Sir Antony MacDonnell has himself taken up the framing of a working plan. The chief defect in these Provinces, specially in Oudh, was the backward condition of primary education, and the Lieutenant-Governor wisely devoted his chief efforts to its extension, and with this object limited the subjects to be taught to the three R's with a little geography and simple drawing. The time has not yet come for further development. The success which has attended Sir Antony Macdonnell's efforts is marked by the extraordinary increase in the number of boys and girls attending Primary schools, *viz.*, 72 per cent in five years. Sciences are taught as optional subjects from an early period in the Middle Schools as a preparation for the B course leading to the "School Final". [This is the 'Modern side' examination for matriculation. Only six students went up this year.] But teachers in science are not yet trained, and but few students at present elect for the course. The value of manual training is acknowledged by the Local Government in its being introduced into the curricula of English schools and of training colleges, but it cannot at present be extended pending the development of primary education and the training of teachers. But in these provinces, as in all others, there would seem to be no objection to the framing of a working plan which would indicate the lines along which future development should take place.

9. In the *Punjab* the working plan of the Educational Department seems, as far as it goes, to be sound and in sufficient conformity with the principles of the Resolution of 1897. Indeed, in 1896 it was found that the Punjab was giving a lead to other Provinces of India in the required direction.

10. The only question is whether in aided schools the "rudiments of elementary science" are comprehensively included in Primary Readers. Thus Geography is optional, and that subject includes the meaning of a map or plan which Mr. Rivaz in 1896 agreed should be taught to all boys.

11. An examination of the Readers from this point of view might perhaps be made with the object of ensuring the comprehension of all rudiments of elementary science in them, whether for Government or Aided Schools. But, generally speaking, the Readers seem to be very satisfactory.

12. Mr. Sime represented that object lessons were employed both as a method and as a subject. This, of course, is unobjectionable. Great attention is given in the normal schools to training the teachers in instructing by objects and illustrations, and progress in schools is proportionate to the rate at which trained teachers are provided to them. The question of introducing educational handwork and manual training has not yet been taken up. Until this has been done, the Punjab scheme does not go far enough.

13. The subject was first discussed in Bengal. Mr. Pedler stated that there was no guarantee that the Secretary of State's nominees were fitted for educational work: that they were, as a rule, "scholars and gentlemen" (a statement which has been confirmed by my recent experience), but that this was not enough; that they ought to receive some training in educational science before coming out, and that men who had already joined in India without training should be allowed, indeed required, to go through some course of

instruction when on furlough.¹ He himself, when informed while on leave that he was nominated as Director, devoted six months to learning in practical ways the science of the new education, and had derived great benefit therefrom—such benefit, I may add, that Mr. Pedler is the only Director in India who seems to have been able to frame a definite scheme on the principles put forward by the Government of India in 1897.²

14. The evidence obtained in Bengal was put before the Director of the next Province visited,—the Central Provinces. “The Bengal Conference is right,” he said; “there are three officers in the Central Provinces staff brought out on the Secretary of State’s nomination—two of us were Secretaries to Members of Parliament, friends of the Secretary of State for India, and came out absolutely ignorant of the science and principles of school instruction; we have had to do the best we could to educate ourselves in language and grope our own way to some knowledge of educational methods and principles at the expense of the schools which we were required to inspect.” This officer supplied me with a note on the subject, part of which is printed below :—

15. “In former days there can hardly be said to have been any regular recruitment for the higher branches of the Educational Department. By the re-organization scheme lately sanctioned, the Department has been divided into two branches—‘Indian’ and ‘Provincial’, and all appointments in the former are made by the Secretary of State at home. It is not denied that the latter makes, in some respects, excellent selections; his nominees have usually taken high honours in well-known Universities and are in two words—scholars and gentlemen”. But it is said that appointments are sometimes made without due regard to the capacity of the nominee for the particular post vacant, and without sufficiently consulting the wishes of the Local Government under whom the officer has to serve. To remedy the latter defect, it has been proposed that the Secretary of State should relinquish his right of appointment to a small Committee, of which he would be the head, and on which there should be at least one member representing the Local Government under whom the nominee goes out to serve. With this in principle I agree, though I am doubtful how it may work in practice. The present practice is not altogether satisfactory, and there is always a danger that appointments may be made rather from personal and political considerations than on merit. It is perhaps significant that of three officers in these Provinces appointed under the re-organisation scheme, two have been Private Secretaries to Members of Parliament.”

The fitting of the nominee for the post to which he is appointed is even more important than his original selection. The qualifications of the candidates

¹The Forest Department supplies a precedent. Officers are allowed to prosecute studies in Germany and France with a sufficient allowance to cover expenses.

²The above remarks do not apply with equal force to lecturing Professors who are brought out to direct the teaching of one subject. But in the case of these also the Bengal Conference thought that the nomination ought not to be left to the sole discretion of the Secretary of State. There should be, they suggested, a small committee to advise the Secretary of State, say two permanent members, and a third either a retired educational officer or one on furlough who would know the needs of the Province.

on the Secretary of State's list are so alike, so excellent in one respect, and so deficient in another, that it might perhaps not matter whether one or another were chosen. Nearly all are men with high University honours, of sufficient social position and presumably the ordinary modicum of sense. The great bulk, however, are totally innocent of any special knowledge of the science or art of education. Gentlemen fresh from a University career are appointed Inspectors, not only ignorant of the language in which they have to inspect, but devoid of any knowledge of elementary education in which their work chiefly lies. It has been suggested, and with this I most heartily concur, that after appointment the nominee should undergo some sort of special training. This training should include a visit to the leading training schools and centres of education in England and on the Continent, and a study of the science and history of education. (*The opportunity should be taken to study the language of the Province to which the officer is appointed.*) It has been recognised that it is not safe to place men as Judges without a special training in law; or as District Officers without knowledge of revenue. In education alone it is apparently considered that a man by the unaided light of reason can produce the best results. Yet, even here, we are inconsistent. We train our masters carefully and thoroughly, but the Inspector over them receives no special training at all. Besides this preliminary training, I think it would be excellent if an officer, when on furlough, were encouraged to visit the chief educational centres, and note the progress made at home in education. In a word, our educational officers, though they have passed through excellent schools and Universities, have generally no special knowledge of educational requirements, and in especial are usually ignorant of elementary education.

Proceeding to Bombay, I received from the Director an illustration supporting the Bengal views in the appointment of the son-in-law of an official having influence at the India Office as Principal of the School of Art, who was utterly unfitted for the post; was compelled to resign; was then forced on the Madras School of Arts from which he has been only last month ejected as incompetent.¹

Both in Madras and the Punjab the Directors agreed generally in the Bengal suggestions.²

¹The Imperial Department of Agriculture suffered in the same way. Dr. Voelcker was allowed to nominate one of his Laboratory assistants who had no qualifications for the post of Imperial Director of Agriculture, and who, in spite of my remonstrances (made after his nomination), was sent out. Five valuable years were lost.

²The Bombay Director, though not opposing the Bengal views, doubts whether the subject is properly sufficiently cognate to the question in hand, *viz.*, "practical and technical education" to be brought under present consideration, and suggests that educational reforms can be studied in blue books and records. I venture to urge that it is a subject for first consideration. For how can officials properly direct education when they have had no practical instruction in educational science and methods. As to the study of blue books, this very Director had never read the Irish reports.

APPENDIX III

Note on the Casanova Boy Artizan School at Naples

This school, with which I have been familiar for two years, was inspected by Sir E. Buck and myself in March and October 1900. As the system which has proved very successful after 30 years' trial in Naples seems to be one which might usefully be considered for application to large towns in India, I have, at Sir E. Buck's request, drawn up the following note describing it.

The school was founded in 1870 by an enlightened Neapolitan gentleman, Alfonso della Valle di Casanova.

It aims at giving to boys belonging to the poorer classes of a notoriously vicious population such mental, moral, and manual training as will turn them into good citizens, honest men, and skilful artizans.

This school is a noteworthy instance of the successful solution of that very difficult problem: "How to create good artizans at a reasonable cost."

The average number on the rolls of the school is now 700, and hundreds of applications for admission have to be rejected every year. This is significant in the face of the following facts:—

- (i) The Neapolitan has rarely any desire to improve his children.
- (ii) The parents of the boys belong to the poorest portion of the population, and each boy has to pay a monthly fee of one lira (about ten annas).
- (iii) The child must, moreover, be decently dressed and clean.
- (iv) Inasmuch as boys are only admitted when they leave the municipal infant school, *i.e.*, at the age of seven, and the course lasts for eight years, the father loses any earnings which the boy might gain before the age of fifteen.
- (v) The parents have to support their boy during the whole of the school period of eight years.

The Casanova school has to a certain extent accepted the principle which is now gradually obtaining acceptance throughout the educational world, that the system of body, hand and eye training to which a beginning is given in the infant schools conducted on Froëbelian lines, should not be interrupted during the school period which necessarily intervenes between the child's leaving the Kindergarten and his becoming physically fit for admission to the workshop. Thus the perceptive and executive faculties are developed during the first three school years by means of physical drill and easy lessons in very elementary drawing, and it is not till the beginning of the fourth year that the boy is admitted to the workshop.

It would enhance the value of the education of the first three years if following the Continental system now being adopted in Great Britain the hand and eye training were made to include elementary manual exercises suitable to the age of 8 to 11. These are described in the Irish Commissioners' report as clay-moulding, paper-folding, cardboard work, etc. Such educational methods, useful in all schools, would be exceptionally valuable in any school specially designated to prepare for workshop instruction.

To withdraw the boys as much as possible from evil home influences, the time daily spent in the school is long, and attendance is enforced even on Sundays and other holidays. These days are devoted to religious instruction and to games. There are no holidays; the school remains open all the year round.

It is thought important to create as early as possible habits of continued application to discourage the expectation of many holidays.

The hours of attendance on all days (Sundays included) are as follows:—

1st and 2nd years	9-15 to 14-00, on Thursday 9-00 to 17-00
3rd year	8-15 to 15-00, on Thursday 9-00 to 17-00
4th year	7-30 to 17-30, on Thursday 7-30 to 17-00
5th, 6th, 7th and 8th years	7-30 to 19-00, on Thursday 7-30 to 17-00

The following table shows how the boys spend their time at school:—

Hours per week on week days only.

BOY'S AGE.	School year	In workshop	Drawing and from 4th year) modelling.	Desk work	Practical Physics and Chemistry.	Gymnastics and drill.	Lunch hour	Total time at school.
1	2	3	4	5	6	7	8	9
8 .	1st	..	5½	21½	..	1½*	3	31½
9 .	2nd	..	4½	20½	..	3½†	3	31½
10 .	3rd	..	12½	21½	..	3½†	4½	41½
11 .	4th	34½	9½	9	..	2	4½	59½
12 .	5th	39	11	9	..	2	6	67
13 to 15	6th, 7th, 8th	39	10	8	2	2	6	67

*Five minutes at a time at intervals during the day.

†One and-a-half hours, as during the first year at intervals during the day; two hours in the gymnasium for two periods of one hour each.

It will be observed that the literary education is entirely separated from the workshop education and could indeed be conducted in a separate school.

For a boy who is to become an artizan, this apportionment of time could with difficulty be improved upon. It might, however, be suggested that during the first two years, three or four hours might with advantage be transferred from "desk work" to "drawing and modelling."

At 11 the boys enter one of the workshops attached to the school. The workshop system adopted is perhaps the most remarkable characteristic of the school. The plant does not belong to the school, nor are the master-artizans salaried teachers of the school; they are private owners of workshops, and they work for a profit.

The advantages to the master-artizan are:—

- (a) a good advertisement, in that the school is frequently visited;
- (b) a rent-free shop;
- (c) labour provided at cheap rates.

In India a further advantage would be gained, *viz.*—

- (d) the improvement of the master-artizan.

The Superintendent of the institution might, for instance, be an expert from England, capable of suggesting improvements in design, pattern, tools and methods, to the master-artizan himself. In Naples, up-to-date improvements are easily learned and adopted outside the school. In India hereditary and stereotyped methods, often clumsy, are blindly continued by artizans, who are generally illiterate and quite unacquainted with the simplest up-to-date improvements or with the new demands which civilisation introduces into the market. The school, in fact, would be a useful means of improving and expanding indigenous industries, an object which is understood to be held specially in view by the Government.

The school provides them with shops (rent-free) on their undertaking to conduct their trade within the school premises, to employ none but boys of the school as apprentices, and to be in all matters obedient to the Principal of the school. For the latter the power is reserved to disapprove and cause the discharge of any workman the master-artizan may employ.

In their last report the Board of Guardians declare that they are satisfied that no better system of giving the boys a thoroughly practical training could be devised; that they draw this conclusion not from theoretical consideration, but from an examination of the results actually obtained in thirty years of continued and careful experiment.

Clearly such a system can only succeed where the services of a Principal of great personal influence and endowed with exceptional tact in dealing with the master-artizans can be secured.

The school teachers have at all times access to the workshops, some of them indeed (called "Educators") constantly patrol the shops, and it is their duty to see that the boys be taught in the best possible way, and that strict discipline be maintained.

Discipline in the workshop.

Each boy has to keep a book in which he makes a sketch, to scale of the piece of work on which he is engaged, and in which he notes, day by day, what particular portion of the work he has completed during the day.

As soon as the boy's work begins to be of value he is allowed to receive wages, the rate being fixed by the controlling authorities on terms favourable to the master-artizan and graduated in accordance with the boy's age and enhanced utility.

This system of attached workshops has the very great advantage of relieving the school authorities of all anxiety regarding the many financial problems which workshops usually give rise to. The whole attention of the Principal and his staff can thus be given to their educational, their more legitimate work.

In India it is especially dangerous for Government officials to enter into buying and selling transactions in connection with which native subordinates are sure to attempt to make some profit for themselves.

The following is a list of the master-artizans who are at present driving their trade within the school building:—

1 Electrical fitter.	1 Watch maker.
1 Bronze founder.	1 Astronomical instrument maker.
1 Printer and type founder.	1 Physical apparatus maker.
1 Cabinet maker.	1 Tinsmith.
1 Carpenter.	1 Blacksmith.
1 Silversmith and electro-plater.	1 Wood Carver and inlayer.
1 Jeweller.	1 Mechanical engineer.

On leaving the school the boys have no difficulty in obtaining work at very satisfactory rates of wages; artizans holding the school's certificates are indeed in great request in Naples.

In the year 1898-99 the school expenditure amounted to about £3,880—about Rs. 80 per boy. Out of this, teachers' salaries account for £2,720, the balance, about £1,160, being spent on buildings, repairs, books, stationery, printing, prizes (£68), water-rate, lighting, municipal taxes. The boys are supplied free of cost with all the books, stationery, drawing materials, and other appliances they require.

The staff consists of the following masters, each drawing the salaries shown opposite their designation in the following table:—

Principal	£192
7 Prefects	63 to 35
9 Elementary school teachers(*)	55 to 50
6 Drawing masters	48 to 24
1 Science master	24
1 Gymnastic instructor	28
1 Singing master	38

(*) The nine elementary school teachers are lent by the Municipality.

This brief sketch of a model institution, which is well worthy of careful study and imitation wherever local conditions may permit, would not be complete without a reference to the great Influence of the school on the success which has rewarded the Principal's efforts to develop boys' character. the moral side of the boys' character. The visitor cannot but notice, on entering the school, the happy contended look on the boys' faces, their courteous, respectful demeanour, the orderliness, neatness and cleanliness of their persons, a reflection of their surroundings. The register of "Histories of former pupils," which is carefully kept up to date, shows that that this good influence is not evanescent.

KRISHNAGAR;

The 31st January 1901.

C. A. RADICE.

APPENDIX IV

NOTE BY SIR E. C. BUCK, K.C.S.I., ON SPECIAL DUTY WITH THE GOVERNMENT OF INDIA, ON AGRICULTURAL EDUCATION IN THE CENTRAL PROVINCES.

In connection with agricultural teaching the position is, in the Central Provinces, satisfactory. In the first place, the great principle followed in Germany that education should be based on lessons given in connection with *Häimatkunde* (familiar surroundings) is fully observed. It was decided at all our Conferences that, as the familiar surroundings of a rural school were agricultural objects, the intelligence of boys attending rural schools should be trained by practical lessons on those objects.

The Central Provinces rural Readers contain a large proportion of chapters on matters and things connected with agriculture.

There is an excellent Government Farm at Nagpur which is utilized for purposes of instruction. All village schoolmasters and now all candidates for normal schools, are passed through a six months' course, and taught at the same time to give lessons on agricultural objects in a practical manner. I heard lessons from the Reader given to a 'practise class' of boys, and nothing could have been better done. Practical illustrations were given at every step.

'Kanungos'* are passed through a two years' course on the farm, but are not of course required to be trained in giving lessons.

There are in the Central Provinces 1,800 village school-masters and 300 kanungos. Of the former, 50 per cent. have already passed through the school. Thus there will be in a short time an agency of over 2,000 trained men spread over the Provinces whose services can be utilized in carrying information to the cultivators. An example will be given below of the manner in which their services can be used.

It must first be stated that, in addition to the practical lessons given by the trained masters in the village schools, practical lessons are given in a field or garden attached to each school. Each boy is given a plot on which to carry out practical experiments. This partly replaces the abandoned 'manual training': †though it does not bring in one of the great objects of manual training *viz.*, "accuracy or exactness," nevertheless it involves "relief from monotony," and "intelligent observation."

The practical results of the system when fully carried out may be illustrated by a concrete example.

On the Government Farm experiments are continuously and carefully carried out with the view of ascertaining what improvements can be effected in Indian agriculture, whether by new methods, improved implements, or better seed, and so on. Several improvements have been more or less worked out. Any

*Called Circle Inspectors or Revenue Inspectors in some other Provinces.

†See Irish Commissioners' Report as to objects of manual training.

improvement which there are *prima facie* grounds for believing to be a success is carried for further trial to Court of Wards Estates which are being gradually equipped with Managers and Assistant Managers who have passed through the school, or in some cases through the Poona College. These are men competent to give a more extended trial of the assumed improvement on different soils and under differing conditions.

The example will now be given. The *juar* crop in the Central Provinces is (as elsewhere) liable to suffer more or less in all years from a disease known as 'smut'. The well-known plan (much adopted in America) of steeping the seed in a solution of sulphate of copper was tried in the farm and every experiment was successful.

Several of the students were then sent to count the percentage of *juar* heads destroyed by 'smut' in a large number of fields taken at random. The computation made on the statistics thus obtained was that there was an average loss of Rs. 4 worth of grain in an acre. On the other hand the cost of steeping the seed was found to be 2 annas an acre.

Assuming that these figures are correct (however extravagant they may really be) and applying them to the total area of *juar* in the Province, which is 2,000,000 acres, there would result a saving of 80 lakhs of rupees, less 2½ lakhs (cost of operation). The net saving would in fact be about equal to the whole revenue demand of the Central Provinces. Even if a tenth of this saving could be effected, it would amount to a very material addition to the agricultural income.

The experiment, however, will first be thoroughly tried on the Court of Wards Estates, which, under the orders of the Government of India, are allowed to be utilized as demonstration farms for all experiments which there are *prima facie* reasons for believing to be likely to succeed. In this instance instructions have already issued for further trials of the plan on Wards' Estates, of which there are many in the Province. If its success is confirmed by results obtained on these estates, the experiment will then have to be communicated to selected cultivators, preference being given to those who have received a practical education in the village schools, for trial on their fields.

The method adopted in this case would be to distribute necessary quantities of sulphate of copper to the 300 Revenue Inspectors, who would re-distribute it to the 1,800 village schoolmasters who number from 8 to 10 in each Circle. The schoolmasters would prepare the solution and, calling together selected cultivators, explain to them the object of the experiment, and give to each a requisite quantity of the solution, on the understanding that if their crops when harvested were found to be comparatively free from 'smut,' they should then pay for the cost of the solution, the price charged being sufficient to cover cases of failure.

Thus the whole machinery through which the experiment would be carried from the central farm to the cultivator's field would be, including the cultivators themselves, trained machinery. In other words, every agent employed would have been taught to understand and appreciate experimental methods.

A system thus carried out leads to the logical deduction that (for the present at any rate) the agricultural technical school is the field of the cultivator. It is not a building costing money. The schools in which the masters and boys are taught elementary principles of agriculture are not technical schools, *i.e.*,

they are not schools in which practical farming is taught. They are schools for training the intelligence, and because the surroundings of rural schools are mainly of an agricultural character, the lessons which are given in them must, as already stated, be based on agricultural objects and subjects. In dealing with the subject of Agricultural Education, the Irish Commissioners in their Report of 1898, based on widespread enquiry throughout the Continent, state that no attempt is to be made in ordinary schools to teach "practical farming," but that teaching is to be confined to the "illustration of the more simple scientific principles that underlie the art and industry of agriculture, and that the art itself is not a subject that properly belongs to elementary education".

The question then arises where and how is the art and industry to be taught. In other words, what are to be the 'technical schools' of agriculture. Are we to bring the cultivators of each locality under a roof and lecture them, and to establish model farms for their instruction at what would be an enormous cost to the State? If not, where are they to be taught 'practical farming'? This is the issue that has to be examined.

The charge has often been made against experimental farms maintained at public expense that the cultivator knows his own business better than any one else—that the experience of centuries has developed methods and practices which are more suited to his local conditions than any that can be taught him by outsiders. This argument, we know, is not true. But there is a large element of truth in it. With ordinary agricultural practice we cannot successfully interfere, and if technical schools and model farms were to be established, there would be little in practical farming to teach at them that the cultivator does not know. It is only occasionally that we are able to produce on our experimental farms a successful experiment which, when confirmed on Court of Wards or private estates, amounts to an improvement so decided that it would be safe to press it upon the cultivating population. And in such cases the best and most natural *locale* on which to teach the cultivator the improvement is, as shown by our illustration, his own field. In other words, the cultivator's field is the technical school. What we have to do is to so train his intelligence by some such system as that already described as to make him willing and anxious to allow his field to be thus used.

APPENDIX V

INTERVIEW WITH MR. TELLERY AT GWALIOR,
1ST MARCH 1901

Mr. Tellery's main proposal is to float a company with a large capital. He effects as much as he can with his own capital including what he borrows from Banks on good security, and is making a good income. But if Indian manufactures are, in the interests of India, to be expanded, a vastly increased capital is required.

He does not ask for pecuniary assistance from Government, only for moral support. His statement that 5 lakhs would be required for expanding silk exports was intended to be a statement of fact, not an application for Government assistance.

He has hitherto worked only for export markets. He employs agents in various countries to study those markets, and manufactures (as far as his means go) what those markets are found to require. His manufactures may or may not comprise oriental patterns and designs according to the circumstances of the demand. His object is not to promote Indian Art, but Indian trade, thus leading to the employment of larger numbers of artizans. He began life in India with no capital, and has gradually built up his trade. In taking up new developments he acts on the same plan of small beginnings leading to important expansion. Thus in his carpet weaving contracts with Amritsar a beginning was made with 5 looms which have in 7 years increased to 176 looms.

His plan is to give contracts from 3 to 7 years. He is bound to give orders up to a certain amount, say, 80 square yards per loom. Either side is liable to fine for breach of contract. Commercial qualities for carpets are three:—

8 × 8 stitches per square yard.

10 × 10 " " "

12 × 12 " " "

Disputes as to quality are settled by arbitration.

Mr. Tellery has not studied imports, only exports. Many imports might be usefully and successfully manufactured in India, *e.g.*, buttons which wood-turners could be easily taught to make cheaper than those imported from Germany. He wonders why no one has taken this up. He would recommend bringing an expert to India and if necessary suitable tools. He would undertake to find experts. There should be Central Schools at which (in turn) the expert should teach. Those taught to teach others at outlying schools. [This agrees with our working-plan.]

He would not make advances except for tools to artizans, but to middle men or merchants who would finance operations. [This agrees with Mr. Chatterton's procedure.] After the trade is established no advances would be required. He considers that in experiments for launching new trades one success would compensate for ten failures.

As to exports, he has spent his life in testing foreign markets for Indian manufactures and is still expanding his operations. He would give the Government the advantage of all his experience if they could help him to form a company. Extended operations would benefit the large class of weavers who above all artisans require support. It is a mistake to think that they cannot compete with mills in some important branches of coarse cotton goods, for the mills cannot make heavy cotton goods so well as the hand-loom. Thus he exports about 100,000 yards yearly of plain al-dyed cotton stuff. (This dye is the Indian red antiseptic dye so largely used in Upper India.) The trade could be expanded with capital very greatly.

In the case of manufactures to compete with imports he would contract to try as much as could be turned out at a less price than the German rate.

The above is an abstract of Mr. Tellery's remarks to me.

My own view is that the Government should undertake the responsibility of experimenting in new manufactures not yet taken up by private enterprise. It has itself furnished precedents in the support it has given to some very important industries, e.g., tea, sugar, beer, leather, cotton and wool manufactures and recently in aluminium manufactures.

In tea, leather, and aluminium Government has led the way in initiating experiments at the cost of the State. The launching of the sugar, beer, cotton and wool manufactures has been assisted by Government contracts, a form of assistance also given to the leather and aluminium industries. Without the help of State contracts the difficulty of launching all these manufactures would have been extremely difficult. I was stationed at Cawnpur for many years from the time that the first mill was erected there and have been intimately acquainted with its commercial progress up to the present time, and I can state with confidence that all the industries named owed the success of their first ventures, during the necessary period of costly experiment, to Government contracts. Now most of the industries named are independent of Government assistance.

At the same time during the 15 or 20 years preceding 1893, all Indian manufactures have been assisted by the *quasi*-protection of a falling rupee, in view of the fact that the cost of production (in wages, etc.) did not rise contemporaneously with the increasing amount of rupees which the price of manufactures paid in gold realized.

Under present conditions there is little left in new directions for which Government can provide contracts, and the rupee for the last few years has been rising not falling, the rise acting as a duty on manufactures inasmuch as wages did not fall with the rise.

The conclusion which I would venture to draw from the above considerations is that, if the Government desire to see other industries than those above noted to be launched, they should assist private enterprise in the first difficult stage of initial experiment. The arguments are—

- (1) That private enterprise is afraid to enter upon that stage, and cannot attract shareholders to companies which, unsupported by Government contract and the protection of a falling rupee, have to run the risk of loss in costly experiments.

- (2) That Government aid should, in default of the support which has hitherto successfully launched many important industries, find some other means of assisting the initial efforts of private enterprise.

In most Continental countries, in America and in Australia, the State has assisted by protective duties. This is admittedly impossible in countries under British control. The form in which I venture to suggest that assistance may be given is—

A. In the case of manufactures to replace imports—

- (1) By appointing special officers to ascertain what imports can possibly be replaced by Indian manufactures.
- (2) By obtaining experts who may or may not be officials to make the experiments requisite to prove whether success is possible in those cases which Government may select for trial.
- (3) By giving advances without or at a low interest for a limited term to contractors, companies or others who provide workmen and machinery for giving effect to successful experiments.
- (4) By inducing influential and patriotic Natives of India either to join in giving such support to private enterprise or to undertake the formation of companies to carry out an entire scheme.

The general policy which underlies these suggestions approaches in character that which is the basis of the scheme for Agricultural Banks in the North-Western Provinces.

B. In the case of exports—

- (1) By encouraging the formation of companies which will undertake the exploration of those fields abroad that have not yet been filled by manufactures of which India does produce or which there is *prima facie* reason to believe that it can produce.
- (2) In the case of the latter class by taking similar measures to those suggested under A.

APPENDIX VI

WEAVING

1. In discussing at the Conferences the trades which require and deserve State encouragement, that of weaving was urged, in every province which I visited, as the one which stands most in need of support. Census statistics show that no industrial hand workers are so numerous as weavers, and every famine that occurs brings out the fact that they form the most destitute section of the population. The position is in fact the same in India as it has been in every country in Europe where machinery has come into competition with the hand-loom.

2. The question is whether any action that Government can take will enable hand-loom goods to hold their own or to make a stronger and therefore longer stand against machine-made fabrics whether imported into or manufactured in this country. It is argued that even on the assumption that the handloom must eventually be ousted by the machine any measure that could be taken to retard the decline of the hand industry would be desirable. Perhaps my treatment of the subject will be more interesting if I record the information and suggestions which I received in the order in which they came to me.

3. The subject was first discussed at Calcutta before I started on my tour. Evidence was brought forward at the Conference that in the district round Serampur near Calcutta an improved hand-loom, perhaps introduced by the Dutch more than a century ago, is used by the weavers of the locality and that the Serampur fabrics have a certain reputation; but that, for reasons not understood, the hand-loom had not found its way into other districts. The presumption was that it was not known to weavers elsewhere in the province.

4. At the same Conference the Principal of the School of Arts mentioned that there had been a recent revival of handloom industries in Europe, and specially in England, the main reason being that it was found more easy to change patterns quickly to meet the demands of fashion, on the hand-loom than on the machine. This statement has been confirmed by an article in a number of the *Nineteenth Century* received in India subsequently to the Conference*.

5. Proceeding to the Central Provinces I found the same desire to exist to support the weavers in their struggle against the machine. Unfortunately I did not then know that the best information on the subject could be obtained at Mr. Tata's Empress Cotton Mills at Nagpur, where more than elsewhere has been done to manufacture fabrics of fine counts, in which class of goods it is thought that the hand-loom has a better chance of success than in the manufacture of coarser fabrics because it is in that class that figured patterns, in producing which the handloom has an advantage over the machine, chiefly prevail.

6. I found, however, at the Nagpur Government Farm that a fine cotton had been 'established', having for several years maintained the same quality from season to season, which was evidently much superior to the ordinary Indian

*I have myself only seen a review of the article in the Indian papers, having being unable to procure the magazine. But the article is evidently one that should be read as bearing on the subject.

cotton. A sample which I sent to Cawnpore factories was valued at 25 per cent. better price than country cotton. In subsequent correspondence Mr. Tata's Secretary has stated that this cotton was produced from Egyptian seed supplied by him, but at the farm it was thought to have been hybridized. However this may be, the main point is that it appears to be sufficiently established to guarantee its permanent reproduction up to the same standard. An improved cotton has also been worked out at the Poona and Cawnpore Farms. Hitherto it had been supposed that fine cotton must be imported at prohibitive cost for the manufacture of the more delicate cotton fabrics in the West of India, but if it is true that the finer fibres can be produced in quantity from the Nagpur seed, one of the difficulties will disappear.

7. Turning now to the coarser counts of cotton, it is a well known fact that large quantities of yarn are distributed from the Cawnpore, Nagpur, Berar and some of the Bombay mills for the use of country weavers. I was assured that the coarse cloths turned out by the hand-looms were stronger than mill cloths and fetched a better price from those who could afford to pay it, and that the inroad made by machine-made coarse goods in the market was due entirely to the cheaper price of the inferior article. In dealing with this question I would advise that statistics be annually obtained of the quantity of yarn and fabrics supplied from mills to country buyers, and that investigation be made as to the difference in price between mill and hand-made goods in the village markets.

8. Going next to Bombay I received a letter from Mr. Enthoven, C. S., strongly advocating measures for the construction of improved hand-looms. This gentleman, who has paid much attention to the subject and has written a valuable monograph on the "cotton fabrics of the Bombay Presidency," believes in the possibility of constructing a hand-loom which will much facilitate the work of the country weaver. He referred in his note to an improved loom at Baroda.

I requested him to embody his views in a note of which a copy is appended. He confirms the policy advised in Bengal of establishing centres of technical instruction for weaver at which the use of improved looms, and the manufacture of patterns, suited to the market, should be taught. His note should be read in full. Before leaving Bombay I was told of an improved loom which had been introduced in the Yerrowda Jail, and which gave 100 per cent. more outturn in the day than the ordinary loom. The English pattern had been modified to suit the limbs of the Indian worker, but subsequent enquiries led to the conclusion that although it could be successfully worked under orders by well fed prisoners, it required, like the Baroda loom mentioned by Mr. Enthoven, and the Yerrowda loom above, more strength than was possessed by the half-starved country weaver who objects, moreover, to change his conservative practices. On the way from Bombay to Madras I passed several mills which were producing nothing but yarn for country weavers, and one which I visited was dealing chiefly with the eastern districts of the Central Provinces.

9. At Madras I discussed the question with Mr. Chatterton and with Mr. Thurston, Principal of the School of Art. Mr. Thurston produced specimens of light fabrics imported from Germany or Manchester for the Southern bazaars. These were full of sizing, extremely poor in quality, and covered with glaring and hideous patterns, which latter were contrasted by Mr. Thurston with the artistic and really beautiful patterns which he had reproduced from the now neglected handblocks of the Indian workman. Mr. Chatterton shared the conviction which I hold that the handblock cannot compete with machine-printing,

but on the assumption that machine printing is done in India instead of Europe there seems no reason why the old patterns should not be preserved, or new ones of a similar character supplied by the School of Arts. Mr. Chatterton's view was that yarns should be supplied by the Government, on the advance system to the weavers; that an improved hand-loom should be worked out and given on a similar system to the craftsmen; that the fabrics produced from the hand-loom should be made over to a Government factory; that the patterns should be there printed on the fabrics by machinery; that the metal cylinder used for the purpose should be engraved by workers in metal, properly instructed, with patterns approved in the School of Arts. Mr. Chatterton added the metal workers of Madras could hold their own with the best engravers in Europe and that cylinder engraving, which is very costly at home, would be much more cheaply effected in India. The employment of colours would require separate measures to be taken for the investigation and use of appropriate dyes. "Under all circumstances," Mr. Chatterton writes, "must Government be prepared to pay for the services of the most competent experts".

10. Assuming that any such plan can be successfully worked, the fact that given counts of cotton can be produced in India itself is encouraging, as it would enable yarn to be supplied to weavers for the lighter fabrics at a cheaper rate than if the cotton had to be imported from Egypt or elsewhere.

Turning now from printed to interwoven patterns, ample evidence is, in Bombay and Madras, forthcoming, that it is in fabrics embroidered with coloured cottons and silks that the weavers compete most successfully with foreign imports, as these cannot be so easily manufactured by machinery and are, by force of custom, preferred by many classes. There exists also a traditional preference for fabrics that do not require the use of scissors and needle which is in favour of the hand-loom. (The remarks on this subject in Mr. Enthoven's monograph should be read.) Nevertheless the cheapness of manufactured articles is daily diminishing the outturn of the once favoured fabrics which are now only purchased by richer customers.

11. Returning to Calcutta I placed the facts which I had collected before a Bengal Conference, at which on this occasion Mr. Mehta, Manager of the Empress Cotton Mills at Calcutta, was present. He confirmed the fact that natives who could afford them preferred the hand-loom to the mill article, and stated that a waist-cloth (lungi) from the hand-loom fetched Rs. 1-12 in the market as against Re. 1 for a similar cloth manufactured by machinery. He valued the Madras cloths supplied by Mr. Thurston at 7 annas a lb., and stated that imported yarn of the same fineness would cost 6 annas a lb. These figures would leave no appreciable margin for the cost of weaving and printing, unless a very much higher price could be obtained for the hand-loom article than could be reasonably expected.

12. At this point I referred the questions concerned to Mr. Padshah (Mr. Tata's Secretary), who was good enough to send me notes by himself and by the Manager of the Nagpur Mills on the subject. They are neither of them hopeful. The only statements in Mr. Padshah's note which are encouraging are—

(1) that "there are some hand-loom patterns which the power-loom cannot imitate;"

(2) that the Nagpur farm cotton was marked with a high value in Egypt;

- (3) that an improved hand-loom is successful where weavers are obliged to use it;
- (4) that Mr. Mehta's estimate of the value of the imported samples was too low.

The manager's note, however, indicates the reasons why country weavers are indisposed to use an improved hand-loom.

A further reason which the manager has not mentioned I learned in Madras and Bengal *viz.*, that workers with fine fibres, especially those used in embroidery, cannot use a loom of any power which is calculated to break fine threads.

13. The abstract which I have now given of the facts and opinions gleaned in the cursory enquiries which the time at my disposal permitted me to make, suffices to show that the subject bristles with difficulties. But this circumstance perhaps justifies a conclusion that the greater the difficulties the more need there is of a thorough attempt to overcome them. If they cannot be altogether surmounted, yet it seems quite reasonable to expect that some action may be possible which will at least afford temporary relief to the weaving communities in their struggle with the manufacturers.

The first point seems to be to attack the question of an improved hand-loom. If it be the fact that the Serampur weavers have for a century used a better loom than their neighbours, and that the prisoners in a jail can be made to turn out fabrics at double the rate of the country weaver there seems to be ground for expectation that a loom can be worked out which will find favour with the weaving classes. In undertaking this and cognate enquiries the Government of India should adopt precautions to prevent independent and disjointed action being taken in each province. Investigation should be conducted under the control of one agent with the assistance of such provincial experts as are willing and able to afford aid. This is the principle which I have already put forward as applicable to all attempts to improve and encourage country industries. It has a special importance in the case of fabrics of finer quality, the manufacture of which requires conditions of climate that are not to be found in every province or even in every part of any one province.

14. It is satisfactory to add that the complications which are involved in the encouragement of the weaving industry will not attend attempts which may be made to promote many other industries. Thus button-making, which Mr. Tellery puts forward as a promising industry, is one which, in many branches, will be found to present few practical difficulties. So too the improvement of basket-making, straw and cane work, etc., advocated at the Bengal Conference is, so far as it can be effected, a simple matter. Other industries in the list I have given elsewhere seem to be capable of easy encouragement. But in all such cases the main principle is the one urged by Mr. Chatterton, that no pains or money should be spared in importing the best experts obtainable—a principle which has been, as already noted, confirmed by the success which has followed the importation of a first class dairy expert from Sweden.

NOTE BY MR. ENTHOVEN, C.S., ON TECHNICAL EDUCATION
APPLIED TO HAND-WEAVING

If technical schools are to be utilized at all for improving the position of the industries of this country, I would urge the claims of hand-weaving to some little consideration. After agriculture, weaving is the leading industry in India; and yet, in so far as I have seen, it receives no adequate recognition in some of our technical schools. At the Baroda Institute, which I visited recently, many youths were employed in turning out wonderful dressing tables which nobody wanted, superior iron railings only suitable for a Gaekwar's garden or a Parsi's mansion, and horse hair bicycle brushes which could not appeal greatly to the average agriculturist. The weaving section, on the other hand, was the smallest in the school, and contained a scanty outfit of two looms, of which one was quite unworkable owing to its requiring greater strength on the part of the worker than the average native possesses, and the other was a cumbersome specimen of the existing type of hand-loom. I am informed by experts that for the production of the saris and coarse khadi cloth which form the bulk of the output of our hand-weavers in this Presidency, a serviceable loom costing about Rs. 200 could probably be imported from Europe, which would produce five or six times the amount of cloth that the present machine gives. The exhibition of such a loom in a technical school with instruction in the method of working, construction and repair, would surely form a valuable part of the work which technical schools could perform in this country.

I am also told by another expert in the same trade that by the simple addition of a dobby to the hand-loom of the country, and by some trifling changes that this addition would involve, many additional descriptions of fabrics could be woven thereon, while the rate of output would also be greatly increased. The difficulties to be overcome lie in the disinclination of the average hand-worker to adopt new implements or strange methods of production. There is also, I believe, considerable distrust of Government interference, the tax gatherer being somehow associated in the mind of the uneducated with any one who takes interest in the intricacies of their trade on behalf of Government. In admitting the existence of such obstacles I am not disposed to think that they would do more than delay for a short time the adoption of improved implements of production. The master-weavers, who in many cases control the hand-workers, are shrewd men with a keen eye to profitable business. Once a new or improved loom were introduced into an important weaving centre, and the fact of its greater efficiency established, I am inclined to presume that the main obstacle to its general adoption would be a want of funds. Here the State might possibly intervene and issue the new looms or the additional appliances to individual weavers on credit, fixing a period of repayment by easy instalments.

The first thing to be done is to experiment with these improved appliances and to select certain types for adoption in all large weaving centres. Further, there is another aspect of the weaving industry which is worth consideration in this connection. At present the looms depend very largely for their orders on the demand arising in India for textiles not produced by the mills. Thus, in famine years the owners suffer, as do the agriculturists, from want of work at a time when foodgrains are selling at prohibitive prices.

There is some ground for believing that many of the finer classes of textiles now on the market in Europe are being woven in increasing quantities on hand-looms, the reason being that the intricacy of the patterns, and more particularly the constant changes in design that fashion and the varying requirements of the

market demand, render the production of such goods on power-looms unprofitable. It seems to me that it would not be foreign to the scope of technical schools, and would be of very great profit to the hand-weaving industry, if instruction were given to the rising generation of weavers in the manufacture of the particular classes of textiles now woven on the hand-looms of Europe, so that they might be led to compete with the European workers, assisted by the enormous advantage which they would obtain from being able to live on a fraction of the sum required by their competitors.

There is no doubt that our most skilled weavers, such as the Kinkob workers of Surat, Ahmedabad and Cambay, could produce anything woven on hand-looms with very little instruction. What is chiefly required is to instil into them the habit of making a class of goods that they have not so far manufactured, and which they would at first be unwilling to weave merely for that reason.

I am informed by a firm of good standing in England, and one that has a leading position in the trade in Indian art wares, that the two great objections to the finer products of the Indian looms are the habit of over-sizing the warp and the tendency to use thread of imperfect filature, the latter objection applying, I take it, mainly to silk goods. Most cotton goods are made of mill spun yarns, though khadi with home spun yarn is not uncommon in some places.

It would presumably be possible in technical schools to correct these errors, and thus to secure for the products of the hand-weavers a larger share of the European market. The hand-weavers of India have been driven back to certain reserves in the shape of textiles which still find a readier market when manufactured by hand, or which are too intricate in pattern to be made by a power-loom, owing to the enormous increase in the mill industry during the last half century, not only in Europe but in Western India. If the present trend of the market in Europe is such as to offer an extension of these reserves to such hand-weavers as are left (and in India, I need scarcely say, they are very numerous), it should surely be one of the first aims of technical education to secure to the skilled workers of this country a fair share of the new market which this development may open to them. I do not know whether any extension of technical schools is contemplated in the near future such as would provide for an institute in every taluka town wherein ocular demonstration might be given of the benefits of improved methods of production and the advantages of manufacturing new designs of textiles. But I am inclined to think that more real good could be done to certain classes of the population by a well considered scheme of this description than by educating them through a course of AEsop's Fables and mental arithmetic to the joys of the "Vicar of Wakefield" and the pleasures of "Self Help" by Smiles.

R. E. ENTHOVEN.

28th January 1901.

Dated the 24th February 1901.

Demi-official from—Sir E. C. BUCK, K.C.S.I., on special duty with the Government of India,

To—Mr. B. J. PADSHAH, Honorary Secretary, Indian University of Research.

In discussing the encouragement of the weaving (hand-mill) industry in Madras, the following scheme was suggested:—

- (1) To provide an improved hand-mill. (There is one at the Yerrowda Jail which is said to turn out work at double the rate of the old hand-mill.)
- (2) To supply the weavers with yarn on advance. This would be counts 30 to 80.
- (3) To print coloured patterns by machinery. Mr. Chatterton stated that the Madras metal-workers could make new patterns on the cylinders much cheaper than they can be made in England.

The object would be to keep out as far as possible Manchester imports.

I understand that Mr. Tata's Empress Mills at Nagpur do turn out finer fabrics, and I have indeed seen some samples at the Indian Museum in Calcutta. In discussing the question with Mr. Mehta of the Empress Mills in Calcutta, he said that the imported yarn cost 6 annas a lb. and that Manchester goods of the class (of which patterns imported to Madras are enclosed) can be bought for 7 annas a lb.

A.—Competition would therefore be impossible unless the native would pay more for the hand-mill fabric than for the imported fabric. This they would probably do as in Calcutta. Mr. Mehta states that the price of a hand-loom lungi is Rs. 1-12-0 against Re 1, the price of a mill lungi. But whether the increase in price is sufficient is another question.

B.—A second measure might be to import Egyptian cotton and spin the yarn by machinery here—Has not Mr. Tata already done this? What could the yarn be sold for per lb.?

C.—A third measure would be to grow finer cotton. I send in a separate parcel a specimen grown at the Poona farm though probably you have already seen this—and I know that Mr. Tata is also making experiments with Egyptian cotton.

D.—A fourth measure is to improve the patterns. This can easily be done.

I now write to ask your opinion and that of Mr. Tata on the whole question. The main point is whether hand-mills can in India compete against—

- (1) Machinery in England,
- (2) Machinery in India,

for fabrics in which the finer counts are used.

An opinion is also solicited on the questions coming under A, B, C.

I shall be greatly obliged if you could send your reply by the post leaving Bombay not later than the 4th March to "Post Office, Cawnpur".

Dated the 2nd March 1901.

From—Mr. B. J. PADSHAH, Honorary Secretary, University of Research, Bombay,

To—Sir E. C. BUCK, K.C.S.I., on special duty with the Government of India.

With reference to the various points raised in your letter, I have the honour to remark as under:—

(1) The fine fabrics turned out at the Empress Mills, Nagpur, are made from Egyptian yarn counts 40s to 80s.

(2) Egyptian cotton is imported by many mills here, and spun into counts ranging from 40s to 80s.

Approximate rates of Egyptian cotton fine yarns made by the local mills would be as follows:—

40s	.	.	.	.	.	.	11 annas per lb.
50s	.	.	.	.	.	.	13 „ „ „
60s	.	.	.	.	.	.	14½ „ „ „
80s	.	.	.	.	.	.	18 to 20 „ „

(3) I am unable to verify Mr. Mehta's figures. To begin with I understand that the samples you have been so good as to enclose to me of chintz or printed cloth, made from *fine* counts, and would realize here 2 annas to 2½ annas per yard which would work out at about *one rupee per lb.* The Manchester cloth, which could be purchased for 7 annas per lb., could be only coarse greys, and not of the quality of the sample enclosed; and similarly, the highest count of Manchester yarn, that is purchasable in Bombay for 6 annas a lb. would be, I am informed, about 20s to 21s.

(4) As you remark, the margin left by Mr. Mehta's figures (if accepted) between the cost of yarn and price of cloth is too small to give much hope for the revival of the hand-loom industry, unless the consumer has some reason to prefer a hand-loom product to a machine product, and is prepared to pay for his preference. I believe that such a preference exists. With the masses, *Valaeti* goods are, curiously enough, in discredit. They suspect mixture, false sizing and deficiencies like these in the machine products, and they are comparatively secure about the absence of these deficiencies in the hand-made article. But I confess I am surprised that the native should submit to an overcharge of so much as 75 per cent. for indulgence in his fancy for hand-loom lungis. I shall make enquiries on this head; but perhaps it may not be inadmissible to refer the figures to Mr. Mehta.

(5) Nor would this overcharge be paid, so long as there is no means of distinguishing between the hand-product and machine-made article. The power-loom is capable, in most cases, of imitating the patterns of the hand-loom; the mere statement of the retail dealer that a certain article is hand-made would not be accepted by the ordinary consumer. In all these cases, the hand-loom can only

compete with the power-loom in the usual way; that is, if its proportion of production to cost is not inferior to that of the power-loom. The cheapness of manual labour in the country, and the long hours for which hand-looms might be plied without restriction from legislation, and probably also the recent import duty on European cloth and excise duty on the Indian Mill product—these factors give some advantage to the hand-loom in competition with its rival. But I know no authentic figures which can demonstrate how far these advantages have gone in pushing the hand-looms in recent years. The probabilities are that they have not gone very far; the enormous production of a power-loom makes the cost of machine-made cloth cheaper than would be agreeable to a hand-weaver.

(6) But there are some hand-loom patterns which the power-loom cannot imitate. An instance is that of certain large sized kerchiefs (*rumal*) used in Madras. Where a pattern is inimitable and known to belong peculiarly to hand work, the consumer will give it a preference, but what price he will pay or does pay for the preference in the particular case adduced I am unable to ascertain. It looks as if, at present, the consumer will not accept the machine-made substitute for the Madras *rumal* at any price.

(7) With regard to the specimen of cotton from the Nagpur Farm, it was raised from Egyptian cotton seeds provided by Mr. Tata for experiment. Mr. Tata informs me that he sent a specimen to Egypt for valuation, and the reply was very satisfactory. The Nagpur specimen was valued at Mitaffi 7½ d. and Abbasai at 9½ d. to 9¾ d. as against the price of average Egyptian cotton which is Mitaffi 7⅔ d. and Abbasai 9d., you will notice that the Nagpur specimen is considered slightly more valuable.

(8) A question which arises—one with which you do not apparently deal—is whether the Indian Mills can successfully compete with Lancashire with regard to finer fabrics. The experiments of Mr. Tata at Nagpur seem to suggest an optimistic conclusion; though, I suspect, it will be found that it is still more profitable, in the present condition of Indian labour, to turn out the coarser fabrics. The question, however, travels beyond the scope prescribed by your letter, and my statements must be largely conjectural. I merely hint at it.

I have been enabled by Mr. Tata's courtesy to send a copy of your letter and this reply to Mr. Bezonjee Mehta, the Manager of the Nagpur Empress Mills, with the request that he would kindly send you direct any supplementary information in his possession.

P.S.—Mr. Bezonjee will be specially requested to furnish information about some hand-looms which he and Mr. Tata endeavoured to introduce in the Central Provinces. I gather that the introduction is successful in goods where men are obliged to learn whatever they are taught; but that ordinary hand-weavers do not take to a new kind of loom. The Yerrowda gaol loom may be of this type. Advantages are thrown away on hand-weavers if they will not avail themselves of them. And in this connection, it would be interesting to know from Mr. O'Connor the figures of the progress of hand-looms benefiting by the recent duty on cotton. It was a substantial disability on the rival of the hand-loom; was it turned to account? Or was the old story repeated that there is no directing brain behind the hand-loom, as there is behind the power-loom?

Dated the 8th March 1901.

From—The Manager, Central India Spinning Weaving and Manufacturing Co., Limited, Nagpur,

To—Sir EDWARD BUCK, K.C.S.I., on special duty with the Government of India.

With reference to Mr. B. J. Padshah's letter of the 2nd instant in reply to your favour of 24th ultimo, I beg to say that we tried to introduce an improved hand-loom some 24 years ago; but that its cost put it out of the reach of the poor hand-weaver. The loom cost Rs. 105, while the hand-weaver's loom does not cost more than Rs. 5. An European firm has recently tried to introduce another improved hand-loom, but the same fate awaits it. I read sometime ago that a Mr. Kelkar, of Poona, had invented a hand-loom and gone to England to perfect his invention. Unless it can lead to as cheap a loom as the hand-weavers at present use, I do not think it will make much headway.

I believe it is possible to nearly double the present production by a simple improvement in the picking or a shuttle throwing arrangement, and if that alone be attempted, the cost would be but trifling. I am afraid, however, the energy would be wanting to work it.

But doubling the production of a hand-loom can scarcely be the salvation of the hand-weaver. It is the reeling, winding, and warping of a single thread at a time that must offer a great drawback to him. We tried to introduce ready-made sized warps and cops for weft. But these did not suit their purpose, or perhaps their usual conservatism came in the way.

During the last famine, we offered sized yarn for warp and cops for weft for them to weave at home. But they complained that this method deprived their women and children of their work and only the head of the family or the weaver himself was kept employed, thus apparently showing that either they could not afford a loom for each working member of the family, or that only one of them could weave and the rest do odd jobs.

They prefer to buy the yarn in bundles and pass it through the several processes with the help of the members of their family. We introduced yarn wound in the shape of balls, so that it could be easily worked in the processes of winding and warping and make much less waste. But this, too, has not made much progress.

The Jails took up our improved hand-looms, because they could afford to do so, and made their own afterwards upon the same model. Some of them also take ready-sized warps, and others yarn in balls. But they employ the prisoners only and have not to think of the prisoner's families.

To supply the weavers with yarn in advance was also tried in the late famine; but small pilferings could not be prevented and strict supervision and checks had to be provided not only to prevent the petty thefts of yarn, but also to prevent the manufactured articles being sold or pledged and the proceeds misappropriated. I believe, however, there is a system in some parts of India, where the Bunia, who knows his men, gives yarn and even dyestuffs to them for working and returning them into finished articles, paying the weavers for their labour,

To print coloured patterns by machinery is certainly going to the Factory system again and would not help the hand-weaver. I should have thought block printing more in their line. But it is interesting to know that Madras metal-workers can make new patterns on cylinders. We have often thought of introducing printing machines in our factory; but the necessity of getting copper rollers engraved with patterns from England, from time to time, has deterred us from making the experiment.

It is hopeless to expect the hand-weaving industry to replace to any appreciable extent the Manchester imports. It has survived so far, because a hand-weaver is the most economical manufacturer though the slowest in the producing capacity. He has not to find interest for his capital; not to protect his property by insurance; nor to find power for driving his machinery; nor to provide for repairs and renewals of same; nor obtain so many articles of stores both to keep the machinery going and to prepare, or I might almost say to sophisticate, the yarn. He has also other advantages, such as mentioned by Mr. Padshah, in the preference for his hand-work which is invariably considered to be the most durable and in the power-loom not being able to imitate certain patterns. Besides, with a power-loom, one uniform texture in a piece of cloth is only possible, while the hand-weaver varies both the reed and the pick in the same piece at will; and makes it look fuller at sides and ends, while it is open or thin in parts. His customers know this, but don't mind it so much, for in certain pieces of cloth, such as pugrees and sarees and some times even in dhoties, the open texture is not visible in the folds, and though they insist upon a certain length they do not mind this apparent defect. Then there are silk, or even gold, threads woven with the cotton and he has the advantage of making solid borders, or head lines of such valuable material, making as little waste as possible. Though an invention has recently been made for imitating by power-loom the solid borders, the advantage, I think, still lies with the hand-weaver. But with all these advantages, his infinitesimally small outturn compared to that of the power-loom leaves him far behind in the race.

So far as I can ascertain, if a hand-weaver with his family can earn from 4 to 6 annas a day, he considers himself lucky.

For the Indian Mills to replace some of the Manchester cloth imports, it is necessary that either American and Egyptian cotton or ready-made Manchester yarns should be imported.

An Ahmedabad Mill is importing yarn and weaving it into cloth. It makes no yarn of its own. Some other mills and we also have imported both cotton and yarn.

As far as our experiment with imported yarn is concerned, it was not very successful. It was found to be weighted with moisture and some of it was found to be of inferior quality. As regards the cotton, and especially Egyptian, it has been found profitable to work it into yarn and sell it or weave it, though the profit has been but very small.

Considering the present state of the Indian Mill Industry in general, it seems most advisable to prosecute further experiments in importing both American and Egyptian cotton, and, by adapting the machinery for spinning it into suitable yarns, weaving it into cloth. Such experiments will at least prevent heavy losses as are now made, though they may not bring in substantial Profits. But, of course, the chief step to take for improving and extending our Cotton

Industry is the growth of long stapled cotton in India itself. So far the experiment of growing the Egyptian cotton at the Nagpur Model Farm has proved successful. I believe you have been shown the correspondence on the subject and the cotton itself. Of course you know Mr. Tata is doing all he can to encourage and promote the cultivation of Egyptian cotton.

The American seed has often been tried and as often given up, but so far a[s] I could see for no valid reason. When sown, it has always given encouraging results. It is being still tried in the Model Farm; but probably fresh seed is needed for renewed experiments. I am not an expert in this matter; but it is just possible that, from time to time new seed both from America and Egypt may have to be imported. But the cost would be trifling compared to the great advantage of growing very valuable crops in India.

We have made finer descriptions of cloth than usual with 40s American and 60s Egyptian warp and 50s American and 80s Egyptian weft imported from Manchester. We have also been making cloth of 32s and 40s warp and 40s and 50s weft of our own spinning, out of Indian cotton. We have now about 140 looms going on this class of manufacture. But as regards 40s warp and 50s weft we find Indian cotton not quite so suitable and have to work it with some difficulty. We make 50s, 60s and 80s twist from Egyptian cotton and sell it to hand-weavers. As the yarn has found a ready sale so far, we have not attempted manufacturing it ourselves, but are quite prepared to do so, should it be found necessary.

As regards the prices given by Mr. Mehta, of Calcutta, there must be some misunderstanding. He probably refers to Indian yarn and grey cloth made out of it. The yarn in the samples you have sent seems to be of 32s and 40s counts, and the price of it in the grey will be about 9 annas a lb., to which printing and other charges must be added.

I may say that a hand-weaver weaves at Ranchi, a coarse sari of No. 6 yarn costing about 5 annas 5 pies per lb. puts in a little Turkey red yarn as borders or headings costing about 10 annas per lb., the total cost of such a sari weighing about 2 lbs. 3 ozs. coming to 11 annas 3 pies. He sells it for 15 annas. So that for the labour of himself and family, he gets 3 annas 9 pies a sari, which he generally gets ready in a day. Another sari, weighing about $2\frac{1}{4}$ lb. of 26s warp and 16s weft, of larger size of course, costs a weaver in Nagpur Rs. 1-3-0, including dyeing charges. This to make takes him a day and he sells it for Rs. 1-8-0, leaving him 5 annas for labour of himself and family. For a silk border sari, the cost of yarn, silk, and dyeing comes to Rs. 4-12-0 in Nagpur. It takes a weaver a week to weave it and he sells it for Rs. 7, which leaves him about 5 annas a day for labour.

There is no doubt there is a preference given to hand-made cloth to Indian Mill cloth and to Indian Mill cloth to English Mill cloth, and higher prices paid on account of ascertained durability; but the difference cannot be so much as Mr. Mehta has given in the case of the lungis. There must be some difference in the texture and manufacture of the cloth. I may say that our customers readily pay about 9 pies a lb. higher rate for our cloth made of 32s warp and 40s weft, than similar cloth made of finer yarn, imported from Manchester.

I think all other points in your letter have been ably dealt with by Mr. Padshah and fear that my remarks may prove both digressive and discursive, but, as desired by Mr. Tata, I submit them to you, hoping that you may find some of them at least worth your attention.

BIOGRAPHICAL SKETCHES

BIOGRAPHICAL SKETCHES

	Page
1. Auckland, George Eden, Earl of (1784-1849)	319
2. Baker, James (1847—)	319
3. Buck, Sir Edward Charles (1838—)	320
4. Chatterton, Sir Alfred (1866—)	320
5. Clibborn, Col. John (1847—)	320
6. Colvin, Sir Auckland (1838—1908)	321
7. Cotton, James Sutherland (1847—)	321
8. Duff, Sir Mountstuart Elphinstone Grant (1829—1906)	321
9. Evans, Henry Farrington (1845—)	322
10. Forbes, Col. John Greenlaw (1837—1910)	322
11. Fuller, Sir (Joseph) Bampfylde (1854—)	322
12. Grant, Sir Robert (1779—1838)	322
13. Hamilton, Rt. Hon. Lord George Francis (1845—)	323
14. Havell, Ernest B. (1861—)	323
15. Hendley, Col. Thomas Holbein (1847—)	324
16. Hewett, Sir John Prescott (1854—)	324
17. Holderness, Col. Hardwicke (1879—)	325
18. Jacob, Col. Sydney Long (1897—1911)	325
19. Kimberley, John Wodehouse, First Earl of (1826—1902)	325
20. Kipling, John Lockwood (1837—)	326
21. Lyall, Sir Alfred Comyn (1835—)	326
22. Macdonnell, Sir Antony Patrick (1844—)	326
23. Pedler, Sir Alexander (1849—)	326
24. Perry, Sir Thomas Erskine (1806—82)	327
25. Sadler, Sir Michael Ernest (1861—)	327
26. Spring, Sir Francis Joseph Edward (1849—)	328
27. Tawnzy, Charles Henry (1837—)	329
28. Temple, Sir Richard, Baronet (1826—1902)	329
29. Thomason, James (1804—53)	330
30. Waterhouse, Lieut.-Col. Sir Ronald (1878—1942)	330
31. Watt, Sir George (1851—)	331

BIOGRAPHICAL SKETCHES OF CERTAIN EMINENT PERSONS FIGURING IN THE VOLUME

1. Auckland, George Eden, Earl of (1784—1849)

Born, August 25, 1784; second son of the first Lord Auckland; educated at Christ Church, Oxford; called to the bar, 1809; President of the Board of Trade and Master of the Mint, 1833; First Lord of the Admiralty, 1834-35; G. C. B.; appointed Governor-General of India, April 4, 1836. In 1836-37 he sent Burnes on a mission to Kabul; in distrust of the Amir, Dost Muhammad, who received in 1837 the Russian officer, Vitkievitch, at Kabul, and with a view to counteract Russian influence there, Auckland, under pressure of the English Government, decided to dethrone Dost Muhammad, and re-instate Shah Shuja as Amir; his declaration of war was issued on October 1, 1838; the facts of the first Afghan war are well known; Dost Muhammad fled in August 1839; Shah Shuja, though set up in 1839, and supported till 1841, was unpopular as a ruler; the British force was reduced; the subsidies were diminished; the Afghans rose in 1841; Sir A. Burnes was murdered on November 2, 1841, and the envoy, Sir W. Macnaughten on December 23; the British army was destroyed in its retreat from Kabul to the Khyber. Lord Auckland was made an Earl in 1839, on the capture of Kabul; he had left India on March 12, 1842, before Pollock's avenging Army had advanced beyond Jalalabad. Afghan affairs chiefly engaged Auckland's attention. In 1840, the British Resident at Ava was expelled by the King of Burma and not re-established. Auckland was again First Lord of the Admiralty in 1846; died, January 1, 1849.

2. Baker, James (1847—?), Kt. of Imperial Order of Francis Joseph, F.R.G.S., F.R. Hist. S.,

Born, 1 Jan., 1847; son of James Baker; married Agnes Anne, daughter of J. Hallett, Swell Court, Somerset; four sons, three daughters; educated by his father, who was successively schoolmaster, Secretary of Clifton College, and founder of a West of England publishing firm; travelled in Greece, Russia, Lapland, Egypt, etc.; made a special study of Bohemia, was voted Great Silver Medal of Prague by Senate for literary work; special correspondent for Pall Mall Gazette, Black and White, The Queen, etc.; Lectures on Egypt, Russia, Palestine, Technical Education, etc.; in 1899 travelled in Tunis and Sicily and studied technical and commercial education in Prussia, Poland, Galicia, and Bohemia, to write a report thereon for the Education Department, published.

1900; travelled in Georgia and Palestine, 1903; Bohemia, 1905; Spain, 1906—9; Bosnia, 1907; Bukovina, 1911; Guest of City of Prague at Palacky and Sokol Commemoration, 1912; Honorary Secretary, British International Association Journalists since 1906; and International Press Conference, 1909; corresponding Member, Royal Academy of Arts, Madrid, 1911, and of Société Archéologique de France, 1913; *Publications*: Quiet War Scenes: Poems and Translations, 1879; Days Afoot and European Sketches, 1881; John Westacott, 1886; By the Western Sea, 1889; Our Foreign Competitors, 1892; Mark Tillotson, 1892; A Forgotten Great Englishman, 1894; Pictures from Bohemia, 1894; The Gleaming Dawn, 1896; The Cardinal's Page, 1898; A Double Choice, 1901; A National Education to National Advancement, 1904; The Inseparables, 1905; The Harrogate Tourist centre, 1906; Literary and Biographical Studies, 1908; Austria: her People and their Homelands, 1912; Reminiscent Gossip of Men and Matters, 1913; has written for the principal magazines.

3. Buck, Sir Edward Charles (1838—?), I.C.S.

Son of Z. Buck, of Norwich; educated, Norwich and Oakham Schools, and Clare College, Cambridge (L.B. 1861; LL.D., 1886); entered the Bengal Civil Service in 1862, and retired in 1897; represented the Indian Government at the Colonial Exhibition, 1886; Secretary to the Government of India, 1882—97; Knight Bachelor and K.C.S.I.; Hon. Fellow of Clare College, 1898.

4. Chatterton, Sir Alfred (1866—?), C.I.E., B.Sc., F.C.G.I., A.M.I.C.E., M.I.M.E.

Born, 10 Oct., 1866; son of J. H. Chatterton; married 1st, 1895, Helen Scott (died 1897), daughter of Henry Borthistle; 2nd, 1901, Alice Gertrude, daughter of W. H. Wilson; two sons, one daughter; educated, Finsbury Technical College; Central Institution, South Kensington; Indian Educational service, 1888; Professor of Engineering, Madras, 1888—1900; Director of Industries, Madras, 1908; Director of Industries and Commerce in Mysore, 1912; Member of the Indian Industrial Commission, 1916—18; Controller, Indian Munitions Board, 1917; Industrial Adviser to the Mysore Durbar, 1918; also Industrial Adviser to the Tata Industrial Bank, Bombay. *Publications*: Agricultural and Industrial Problems in India; Lift Irrigation; Industrial Evolution in India.

5. Clibborn, Colonel John (1847—?), C.I.E., F.R.S.A.

Born, 8 Dec., 1847; son of C. J. Clibborn, J. P., of the Castle Moate, co. Westmeath; married, 1881, Leonie, daughter of Surg.-Gen. Hamilton. R.A.M.C.; two daughters; educated, Trinity

College, Dublin, B.A. and L.C.E., 1869; entered 62nd Regiment, 1869; Indian Staff Corps, 1872; Irrigation Dept., 1872—81, and 1882—92; Agricultural Dept., 1881—82; Fellow of the Allahabad University, 1892; Principal, Thomason Engineering College, Roorkee, 1892—1901; member of the Commission of the Research University, 1902; President of the Committee of Industrial Education, India, 1902; Inspecting Engineer, Egyptian Railways, 1902—5 and 1908-9; Lieut., 1872; Capt., 1881; Major, 1889; Lieut.-Col., 1897; Col., 1923. *Publications*: Irrigation Work in India, etc.

6. Colvin, Sir Auckland (1838—1908), K.C.S.I. K.C.M.G., C.I.E.; Grand Cordons of Osmanieh and Medjidie.

Born 1838; son of late John Russell Colvin, Bengal Civil Service (who died Lieut.-Gov., Agra Presidency 1857); married, 1859, Charlotte Ellizabeth, daughter of late Lieut.-General Charles Herbert, C. B.; educated, Eton; East India Company's College, Haileybury; Various posts in Indian Civil Service, 1858—79; Comptroller-Gen. Egypt, 1880—83; Financial Member of Viceroy's Council, India, 1883—87; Lieut.-Gov., North-West Provinces and Oudh, 1887—92; retired from India, 1892; Chairman, Burmah Railways Company and Egyptian Delta Light Railways Company; *Publications*: John Russell Colvin (Rulers of India Series), 1895; The Making of Modern Egypt, 1906.

7. Cotton, James Sutherland (1847—?), M.A.

Born, Conoor, Madras, 17 July, 1847; son of J.J. Cotton, Madras Civil Service; married, 1873, Isabella, daughter of John Carter, Clifton, Bristol; educated, Magdalen Coll. School; Brighton Coll.; Winchester Coll.; Trin. Coll. Oxford; Scholar of Trin. Coll.; Fellow and Lecturer of Queen's Coll. Oxford; 1st class Classical Moderations; 1st class Final Classical school. Barr.; editor, revised edition Imperial Gazetteer of India; Hon. Secretary, Egypt Exploration Fund; late editor of The Academy; *Publications*: Decennial Report on the Moral and Material Progress of India, 1885; India, Citizen Series, 1883; Elphinstone, Rulers of India Series, 1892, Quinquennial Report on Education in India, 1898; editor of Paterson's Practical Statutes.

8. Duff, Sir Mountstuart Elphinstone Grant (1829—1906).

Born at his father's estate of Eden in Aberdeenshire and educated at Edinburgh and Balliol; in 1854, was called to the bar; was Liberal M.P. for the Elgin Burghs, 1857-81; was Governor of Madras till 1886 when he was made a G.C.S.I.

9. Evans, Henry Farrington (1845—?), C.S.I.; I.C.S.

Born, 6 March, 1845; son of Rev. G. H. Evans and Maria Harriet, daughter of Sir Henry Farrington, 3rd Bt.; married 1st, 1877, Edith Florence (died 1878), daughter of Dr. Wright; 2nd, 1887, Alice Athalie (died 1888) daughter of J. H. Prinsep; 3rd, 1899, Blanche Frances Emily, daughter of Rev. A. Drummond Wilkins; three sons, one daughter; educated, Marlborough College; and C.C.C. Oxford (B.A. 1867); entered I.C.S. 1867; Commissioner, 1893; Chief Secy. to Government, 1896; member of Revenue Board, 1898; member of Legislative Council, N. W. Prov. and Oudh, 1900; retired, 1902.

10. Forbes, Colonel John Greenlaw (1837—1910), C.B.

Born, 20 Aug., 1837; entered Royal Engineers (Bengal), 1854; served Indian Mutiny 1857-58 (wounded, despatches, medal, three clasps); was Chief Engineer and Secretary to Resident at Hyderabad, 1879—81, and to Government of United Provinces, 1881—89; Colonel, 1885; Inspector-General of Irrigation in India, 1889-90; and Secretary to Government of India, Public Works Department, 1890—92.

11. Fuller, Sir (Joseph) Bampfylde (1854—?) K.C.S.I., C.S.I., C.I.E., I.C.S.

Born, 20 March, 1854; son of Rev. J. Fuller, late Vicar of Ramsdale, Hants; married 1st, 1879, Maria Caldwell (died 1880), daughter of Colonel Aston, Bombay C.S.; 2nd, 1884, Sarah Augusta (died 1923), daughter of Arthur Wellesley Critchley; 3rd, 1924, Gabrielle Marie Adele, daughter of late Prof. Eugene Rousselin; educated, Marlborough College; appointed Commissioner of Settlements and Agriculture, Central Provinces, 1885; Additional Member of Viceroy's Council, 1899; Secretary to Government of India, Revenue and Agricultural Departments, 1901-02; Chief Commissioner of Assam, 1902—5; Lieut.-Governor of Eastern Bengal and Assam, 1905; resigned, 1906; *Publications*: *Studies of Indian Life and Sentiment*, 1910; *The Empire of India*, 1913; *Life and Human Nature*, 1914; *The Science of Ourselves*, 1921; *Causes and Consequences*, 1923; *The Law Within*, 1926; *Etheric Energies*, 1928; *Some Personal Experiences*, 1930.

12. Grant, Sir Robert (1779—1838).

Born in Bengal, 1779; second son of Charles Grant; went to England, 1790; educated, Magdalen College, Cambridge, Craven Scholar, 1799; third wrangler, Chancellor's Medallist and Fellow;

called to the Bar at Lincoln's Inn. 1807; M.P. for various constituencies from 1818 to 1834; advocated Jewish emancipation from civil disabilities; Judge Advocate General, 1832; Knighted, 1834; Governor of Bombay from March 17, 1835; G.C.H.; died of apoplexy at Dapuri, July 9, 1838; *Publications*: Sketch of the History of the E.I.Co., from its first foundation to 1773; a View of the System and Merits of the East India College, Haileybury, and a volume of sacred poems, which was edited by his brother, Lord Glenelg. The Grant Medical College at Bombay was erected as a memorial to him.

13. Hamilton, Rt. Hon. Lord George Francis (1845—?), P.C., D.C.L.; LL.D., G.C.S.I.

Born, Dec. 17, 1845; 3rd son of 1st Duke of Abercorn; married, daughter of 3rd Earl of Harewood, 1871; educated, Harrow; M.P., County of Middlesex, 1868—85; M.P., Ealing Division, 1885—1906; Under-Secretary of State for India, 1874—78; Vice-President of Council, 1878—80; First Lord of the Admiralty, 1885-86, 1886—92; Secretary of State for India, 1895—1903; Provincial Grand Master Middlesex since 1892; Captain of Deal Castle since 1899; Chairman of Governors of Harrow School; Chairman of Royal Commission upon Poor Law and Unemployment, 1905—9.

14. Havell, Ernest B. (1861—?), A.R.C.A., Indian Educational Service.

Born, 1861; son of late C. R. Havell; married 1894, Lilli, daughter of late Admiral George Jacobson, Danish Royal Navy; one daughter; educated, Reading School; Royal College of Art; Paris Studios; private study in Italy; Superintendent of the Madras School of Arts, 1884—92; as Reporter to Government on Arts and Industries conducted an official investigation into the indigenous handicrafts; Principal of the Calcutta School of Art and Keeper of the Government Art Gallery, 1896—1906; re-organised Art Education on Indian lines and helped to form the New School of Indian Painting; initiated a movement for the revival of hand-loom weaving, which has since made considerable progress throughout India; as Fellow of the Calcutta University took an active part in the discussion of university reform, and drew up the report of a committee appointed by Government in 1901 for revising the scheme of vernacular education in Bengal; served in British Legation, Copenhagen, 1916—23; *Publications*: A Handbook to Agra and the Taj; Benares, the Sacred City; Indian Sculpture and Painting; The Ideals of Indian Art; Indian Architecture, its Psychology, Structure and History; Essays on Indian

Art, Industry, and Education; The Basis for Artistic and Industrial Revival in India; The Ancient and Medieval Architecture of India, 1915; The History of Aryan Rule in India, 1918; A Handbook of Indian Art, 1920; A Short History of India, 1924; The Himalayas in Indian Art, 1924; articles on Indian history, art, economics, and politics in Harmsworth's Universal History, and in English, American, and Indian reviews.

15. Hendley, Col. Thomas Holbein (1847—?), C.I.E., V.D.; Indian Medical Service.

Born, 1847, son of T. Hendley; married, 1872, Jane Elizabeth, daughter of Rev. John Dawson Hull, Vicar of Wickhambrook, Suffolk; one son; educated, privately, and St. Bartholomew's Hospital; M.R.C.S., L.R.C.P. London; 27 years under Foreign Dept. India, of which 24 were as Residency surgeon, Jaipur, the last three also as Admin. Med. officer, Rajputana; Inspector-Gen. of Civil Hospitals, Bengal, 1898—1903; and officiating, N.W. Provinces and Oudh, 1897; Chairman, Executive Committee, Jaipur Exhibition, 1883; Member of Executive Council and a Governor of Imperial Institute, 1891-92, and organised its first exhibition (Indian Art Metal Work) 1892; President, Decennial (2nd) Art Conference at Lahore, 1894; and Member Judging Com. Delhi Exhibition, 1903; Hon. Vice-Pres. (Trop. sect.) International Congress of Hygiene, 1894; acting President Plague Commission, Calcutta, 1898; Fellow, Calcutta University, 1899—1903; and Member of Syndicate, 1899; Vice-President, Asiatic Society of Bengal and Trustee, Indian Museum, 1899—1903; Hon. Associate, St. John of Jerusalem, 1904; Knight of Grace, 1909; Chairman, Indian Section Festival of Empire, 1911; *Publications*: author of several works on Indian Art; Rulers of India and Chiefs of Rajputana, 1897; Medico-Topographical Histories of Jeypore and Rajputana, etc.

16. Hewett, Sir John Prescott (1854—?), G.C.S.I., K.C.S.I., C.S.I., C.I.E.

Born, Barham, Kent, 25 August, 1854; son of Rev. John Hewett and Anna Louisa Lyster, daughter of Capt. Hammon; married, 1879, Ethel Charlotte, daughter of Henry Binny Webster, B.C.S.; educated, Winchester; Balliol Coll. Oxford; Joined Bengal Civil Service, 1877; served in North-Western Provinces and Oudh, 1877—1886; Under Secretary to Government of India in the Home Department, 1886; acted Private Secretary to Viceroy and Governor-General of India, 1888, 1890; Deputy Secretary to Government of India in Home Department, Dec., 1890; Magistrate and Collector in North-Western Provinces, 1893; Secretary to Royal

Commission on Opium, 1893; member of the Indian Plague Commission, Nov., 1898; Secretary to Government of India, Home Department, 1894—1902; Chief Commissioner of the Central Provinces, 1902; Ordinary Member of Governor-General's Council, India, in charge of Department of Commerce and Industry, 1904; Lieut.-Governor, United Provinces of Agra and Oudh, 1907—12; President, Coronation Durbar Committee, 1911.

17. Holderness, Colonel Hardwicke (1879—?), D.S.O., Indian Army.

Born, 10 Jan., 1879; 2nd son of late Robert Fitzroy Holderness of Wai-iti, Eyreton and Christchurch, New Zealand; married, 1st, Caroline Maud (died 1905), daughter of late W. H. Gray, Phoenix House, Chelmsford; 2nd, Phyllis Elizabeth, daughter of late Andrew Armstrong, M. A., J. P. of Hollywood, Carrickinines, Co. Dublin; educated, Christ's Coll., Christchurch, New Zealand; 2nd Lieut., 2nd Batt., Essex Regt., 1900; Lieut., 1900; Lieut., Indian Army, 1901; Captain, 1909; Major, 1916; Lieut.-Colonel, 1923; Commanded I Batt., 1st K. G. O. Goorkha Rifles, 1923—28; Colonel, 1927; commanding Ahmednagar Wing (Vickers Gun) small arms school, India; served N. W. Frontier of India (Waziristan), 1901 and 1902 (medal and clasp); European War (despatches, D.S.O., 1914-15 Star, War and Victory medals); retired, 1932.

18. Jacob, Colonel Sydney Long (1897—1911), C.I.E.

Born, 19 July, 1845; son of Major-General Jacob of the Bombay Army; married, 1869, Petronella, daughter of late H. P. Selby of Ceylon; educated, Lansdown Coll. Bath; Woolwich (Pollock Gold Medal and Sword of Honour); entered Royal Engineers, 1865; went to India, 1868; appointed P.W.D., 1869; served in the Punjab, 1870—1900; promoted to Chief Engineer, 1897; Field Engineer in the Khyber, 1879; retired 1900; *Decorated*: Famine work and administration of the P.W.D. Punjab; *Publications*: What is a Christian?; Differences of the Four Gospels.

19. Kimberley, John Wodehouse, First Earl Of (1826—1902).

Born, Jan. 7, 1826; son of Hon. Henry Wodehouse; succeeded his grandfather as third Baron, 1846; educated, Eton and Christ Church, Oxford; first class honours, 1847; Under Secretary of State for Foreign Affairs, 1852; for India, April-Nov., 1864; created first Earl of Kimberley, 1866; Lord Lieutenant of Ireland, Lord Privy Seal, Secretary for the Colonies, etc.; Secretary of State for India, Dec. 16, 1882, to June 24, 1885; again Feb. 7, to Aug. 4, 1886; and

again Aug. 19, 1892 to March 10, 1894; Lord President of the Council, and Foreign Secretary, 1894-5; K.G., 1885; died April 8, 1902.

20. Kipling, John Lockwood (1837--?).

Born, 1837; son of Rev. Joseph Kipling; educated, Woodhouse Grove; Architectural Sculptor, Bombay School of Art, 1865-75; Principal, Mayo School of Art; Curator, Central Museum, Lahore, 1875-93; C.I.E., 1886; retired from the Indian Education Department, 1893; *Publications*: *Beast and Man in India*.

21. Lyll, Sir Alfred Comyn (1835--?), I.C.S.

Born, 1835; son of Rev. Alfred Lyall; educated, Eton and Haileybury; entered the Bengal Civil Service, 1855; in the Indian mutiny saw service in the Bulandshahr District, at Meerut, and with the *Khaki Risala* of volunteers; Commissioner in Berar, 1867; Secretary to the Government of India in the Home, 1873-74, and Foreign, 1878-82, Departments; A.G.G. for Rajputana, 1874-8; Lieutenant-Governor of N.W.P., 1882-7; Chancellor of the Allahabad University; Member of the Council of India, 1888-1903; K.C.B., 1881; G.C.I.E., 1896; D.C.L., Oxford; LL.D., Cambridge; P.C., 1902; *Publications*: *Verses written in India*; *British Dominion in India*; *Asiatic Studies*; *Life of Warren Hastings* (English Men of Action Series).

22. Macdonnell, Sir Antony Patrick (1844--?), I.C.S.

Educated, Queen's College, Galway; joined the Indian Civil Service in Lower Bengal, 1865, Revenue Secretary to the Government of Bengal; Secretary to the Government of India, Home Department; Acting Chief Commissioner of Burma, 1889; Chief Commissioner of the Central Provinces, 1891; Acting Lieutenant-Governor of Bengal, 1893; Member of the Supreme Council, 1893-95; Lieutenant-Governor of N.W.P., 1895-1901; Member of the Council of India, 1902; his services lent, to be Under Secretary to Lord Lieutenant of Ireland, 1902; K.C.S.I., 1893; G.C.S.I., 1897; P.C., 1902 and P. C. Ireland, 1903; K.C.V.O., 1903.

23. Pedler, Sir Alexander (1849--?), K.T., C.I.E., F.R.S.

Born, 21st May, 1849; educated, City of London School and the Royal College of Science; joined the Educational Department, 1873, and was appointed Professor of Chemistry at the Presidency College, Calcutta; in 1875, he officiated as Meteorological Reporter to the Government of Bengal in addition to his own duties, and

held this appointment till 1890, officiating on various occasions as Meteorological Reporter, and Principal of the Presidency College, Calcutta; held the joint appointments of Professor of Chemistry and Meteorological Reporter from 1890 to 1895, when, after returning from furlough, he, in 1896, was appointed Principal of the Presidency College; officiated as Inspector of Schools on several occasions, and on January 3, 1899, was appointed Director of Public Instruction, Bengal; was a member of the Educational Conference (Imperial) in 1901 and was on special duty with the University Commission from 9th February 1902 to 9th June of the same year; in 1904, he served on the Committee appointed to enquire into the financial condition of European schools; in 1904, he was appointed Vice-Chancellor of the Calcutta University; made many valuable contributions to journals on Chemical, Scientific, and Educational matters, and has been prominently connected with the Asiatic Society of Bengal; member of three Government expeditions sent to observe total eclipses of the sun in Sicily, at the Nicobar Island, and Viziadrug; knighted for his long services in the Education Department, Jan. 1906.

24. Perry, Sir Thomas Erskine (1806—82)

Born, July 20, 1806; son of James Perry of the *Morning Chronicle*; educated, Charterhouse and Trinity College, Cambridge, where he graduated, 1829; was at the University of Munich, 1829—31; took part in the Reform Agitation; became Secretary to the National Political Union of London; called to the bar by the Inner Temple, 1834; became law reporter; in 1841, on losing his fortune, he applied for and obtained a Judgeship in the Bombay Supreme Court; was knighted, 1841; became Chief Justice in 1847; President of the Board of Education for 10 years; promoted higher education and educational institutions; retired from India, 1852; a Professorship of Law was founded at Bombay in his memory; M.P. for Devenport, 1854—59; attacked Lord Dalhousie's administration, and spoke constantly on Indian subjects; Member of the Council for India, 1859—82; Privy Councillor, 1882; died, April 22, 1882; *Publications*: wrote on Indian Law and other subjects: *Cases Illustrative of Oriental Life*; *A Bird's Eye View of India*.

25. Sadler, Sir Michael Ernest (1861—?), C.B., K.C.S.I.

Born, Barnsley, 3 July, 1861; son of Michael Thomas Sadler, M.D.; married, 1885, Mary, daughter of Charles Harvey; one son; educated Rugby; Trinity College, Oxford (Scholar, 1880—84), President of Oxford Union Society, 1882; secretary of the Oxford Univ. Extension, 1885—95; steward of Christ Church, Oxford, 1886—95;

student of Christ Church, Oxford, 1890—95; member of Royal Commission on Secondary Education, 1893—95; Director of Special Inquiries and Reports in the Education Department, 1895—1903; Professor of the History and Administration of Education, Victoria University of Manchester, 1903—1911; Vice-Chancellor, Leeds University, Chairman of the Teachers' Registration Council, 1915—22; President, Calcutta University Commission, 1917—19; Master of University College, Oxford, since 1923; Hon. Student of Christ Church, Oxford; Hon. Freeman of the Clothworkers' Company; Rede Lecturer, 1928; Sachs Lecturer of Teachers' College, Columbia University, New York, 1930; Hon. Litt. D. Manchester, Sheffield and Leeds Universities; Hon. LL.D. Columbia, Liverpool, Toronto, and Cambridge Universities; Officer de l' Instruction publique; *Publications*: edited, from the beginning of the series till 1903, the Special Reports on Educational Subjects issued by the Board of Education, himself contributing a number of papers (among which are Problems in Prussian Secondary Education; The Realschulen of Berlin; Higher Commercial Education at Antwerp, Leipzig, etc.; Unrest in Secondary Education in Germany, France, America, and elsewhere); Continuation Schools in England and elsewhere; Moral Instruction and Training; Reports on Secondary and Higher Education in Sheffield, Liverpool, Birkenhead, Derbyshire, Hampshire, Huddersfield, Exeter, and Newcastle-upon-Tyne; Our Public Elementary Schools, 1926.

26. Spring, Sir Francis Joseph Edward (1849—?), K.C.I.E., C.I.E.

Born, 20 Jan., 1849; son of Rev. Edward Spring, County Cork, Ireland; married, 1873, Charlotte Becher (died 1930), daughter of S. Townsend, J.P.; educated, Middleton School, Co. Cork; Trinity College, Dublin; entered Indian Government Engineering Service, 1870; was for over ten years a Member of Madras Legislative Council; Member of Council of Institution of Civil Engineers of the Institute of Mechanical Engineers, of the Institute of Transport, and of American Society C.E.; Hon. Life Member of the Institution of Engineers, India; Hon. Fellow of the Society of Engineers; was connected for 33 years with the making or the working or the administration of railways in India; and during 15½ years more with the development and management of the Port of Madras as Chairman and Chief Engineer of the Port Authority; has been Consulting Engineer to the Port of Chittagong; President, South Indian Motor Union; Vice-Commodore, Madras Sailing Club; Hon. Member, Madras Chamber of Commerce; Hon. Maj., South India Railway Volunteer Rifles; was Director of Railway Construction,

India, and Deputy Secretary to the Government of India; Under Secretary for Railways to Government of Bengal; Engineer-in-Chief of the Kishna Bridge; Engineer-in-Chief and Manager of the East Coast Railway; for 20 years a Fellow of Madras or Calcutta University, Member of the Syndicate of Madras University, and President of its Faculty of Engineering; seven years Secretary to Government of Madras, Public Works Department, Railways, and Senior Government Inspector of Railways, Madras; retired as Chief Engineer, 1st class, 1904; was for three years on the Council of the Indian Institute of Science; *Publications*: has written on technical education, on light railways of local interests, and on the training and control of great rivers.

27. Tawney, Charles Henry (1837—?).

Son of Rev. Richard Tawney; educated, Rugby and Trinity College, Cambridge; scholar; senior classic, 1860; Fellow of Trinity College, 1860; for many years Professor and President of the Presidency College, Calcutta, and Registrar of the Calcutta University; officiated thrice as Director of Public Instruction, Bengal; author of several translations from the Sanskrit; C.I.E.; Librarian of the India Office; retired, 1903.

28. Temple, Sir Richard, Baronet (1826—1902), I.C.S.

Born, March 8, 1826; eldest son of Richard Temple, of the Nash, Kempsey, Worcestershire; educated at Rugby and Haileybury; arrived in India, January, 1847; he was soon transferred to the Punjab and chosen to be Secretary to the Punjab Government; in 1860, he became Chief Assistant to the Financial Members of Council, Mr. James Wilson and Mr. Samuel Laing; Member of the Bengal Indigo Commission and other Commissions; in 1862, he was appointed Chief Commissioner of the Central Provinces, where he "initiated good government"; Resident at Hyderabad, 1867; Foreign Secretary to the Government of India, 1868; Financial Member of Council, 1868—74, taking a leading part in advocating a legal tender gold currency for India; in January 1874, he was appointed by Lord Northbrook to superintend the relief operations in the famine districts of Bengal, and was Lieutenant-Governor of Bengal, April 1874, to January 1877. This was the first occasion on which complete measures were taken by Government to combat famine. The expenditure was very large, but success was fully attained. In January 1877, Temple was deputed by the Government of India to Madras and Bombay, to advise on the famine-relief operations required in those Presidencies. He entered on the Governorship of Bombay on May 1,

1877; despatched thence the Indian troops to Malta in 1878, and afforded great assistance in the movements connected with the Afghan War. His statue was erected in Bombay by public subscription. He retired to England in March, 1880, to contest East Worcestershire as a Conservative, but was unsuccessful. He subsequently sat in Parliament for the Evesham Division of Worcestershire, 1885—92, and the Kingston Division of Surrey, 1892—95. For some years he was Vice-Chairman and Chairman of the Finance Committee of the London School Board. He travelled largely, and presided over and addressed many scientific and religious Societies and Associations connected with India. He was made a C.S.I., 1866; K.C.S.I., 1867; a Baronet, 1876, for his famine services, and G.C.S.I., January, 1878; also D.C.L. of Oxford, LL.D. of Cambridge, and F.R.S. On January 8, 1896, he was sworn a member of the Privy Council, and retired from Parliament. He died at Heath Brow, Hampstead, on March 15, 1902; His activity and energy of mind and body, and the enormous capacity for work which had distinguished him in India were maintained to the last. His kindness of heart, geniality and moderation made him generally popular throughout his career; *Publications*: India in 1880; Men and Events of my Time in India, 1882; Oriental Experiences, 1883; Cosmopolitan Essays, 1886; Journals kept in Hyderabad, Sikkim and Kashmir; The Story of my life, 1896; A Bird's Eye-view of Picturesque India, 1898; John Lawrence; James Thomason.

29. Thomason James (1804—53), I.C.S.

Born, May 3, 1804; son of Rev. Thomas Truebody Thomason, Indian Chaplain; educated, Stansted; and Haileybury, 1820—22; to India, 1822; Registrar of the *Sadr* Court; Secretary to Government, 1830—32; Magistrate-Collector of Azamgarh, 1832—37; Secretary to the Agra Government, 1837—41; Member of the Board of Revenue, 1841; Foreign Secretary to the Government of India, 1842-43; Lieutenant-Governor of the N.W.P., December 1843, to September 1853; died at Bareilly, September 29, 1853; appointed Governor of Madras on the day of his death; was a very successful administrator in every branch, and greatly advanced the N.W.P.

30. Waterhouse, Lieut.-Colonel Sir Ronald (1878—1942), K.C.B., C.B., C.M.G., C.V.O., late 6th Dragoon Guards; one of H.M.'s Lieutenants for the City of London.

Born, 28 Dec., 1878; married 1st, 1904, Violet (died 1928), younger daughter of late John Dalrymple Goldingham, I.C.S.;

married, 2nd, 1928, Nourah, only daughter of Late Harry Athelston Chard, Clevedon, Somerset; educated, Marlborough; Oxford University; served Mashonaland, 1896—97 (Matabele Medal); entered Militia, 1898; 1st Commission, Lincolnshire Regiment, 1899; subsequently transferred to 6th Dragoon Guards, Carabiniers; South African War, 1899—1902 (despatches, Queen's medal four clasps, King's medal two clasps); Bangalore, India, 1903-4; retired pay, 1910; on account of wounds, and wound pension; European War, 1914—18 (despatches, Mons Star, British War Medal, Victory Medal); War Office, Intelligence Department, June 1915; Major and General Staff Officer 3rd Grade, October 1915; 2nd Grade, 1917; Lieutenant-Colonel and Staff Officer 1st Grade, 1918; Private Secretary to Chief of Air Staff Air Ministry, 1918; to Controller-General of Civil Aviation, 1919; to Lord Privy Seal and Leader of the House of Commons (Mr. Bonar Law, Mr. Austen Chamberlain), 1920-21; Private Secretary and Equerry to the Duke of York, 1921; Principal Private Secretary to the Prime Minister, 1922—1928 (Mr. Bonar Law, Mr. J. Ramsay MacDonald, and Mr. Stanley Baldwin); Member of Air Section and British Delegation to Peace Conference, Paris; Flight Lieutenant and Staff Officer, 1940; Fellow of the Royal Geographical Society; Order of St. John of Jerusalem; Queen's Jubilee Medal, 1897; G.O. White Eagle, Serbia; St. Maurice and St. Lazarus, Italy; G. C. Crown of Roumania and Lion and Sun of Persia; has also Order of Leopold I. of Belgium, and Sacred Treasure of Japan.

31. Watt, Sir George (1851—?); Kt., M.B., C.M., F.L.S., C.I.E., LL.D. (Aberd and Glasg.); J. P. (Dumfries).

Born, Old Meldrum, Aberdeenshire, 24 April 1851; son of late John Watt and Margaret Rennie; married Jane, daughter of Robert Simmie, Her Majesty's Customs, Morayshire, one son, two daughters; educated, Grammar School, King's College, and Marischal College, Aberdeen (1861—1871); Glasgow University (1872); Professor of Botany, Calcutta University, 1873—1884; deputed to Burma-Manipur Boundary Commission as scientific and medical officer, 1882; joined Supreme Government Secretariat as scientific assistant secretary, 1884; in charge Indian Section, Calcutta International Exhibition, 1884; Commissioner for India at Colonial and Indian Exhibition. London, 1885-86; Reporter on Economic products to Govt. of India, 1887—1903; Governor of Imperial Institute on behalf of India during 1892; editor, *The Agricultural Ledger*, 1892—1903; President, Pharmacological Section, Indian Medical Congress, 1894; officer in charge, Industrial Museum, Calcutta, 1894—1903; received Daniel Hanbury Gold Medal of Pharmaceutical

Society, 1901; Member and Hon. Secretary of the Central Indigenous Drugs Committee of India and editor of their Report, 1901; Director, Indian Art Exhibition in Delhi, 1903; on special duty in London, 1904—8; retired from Indian Service, 1906; Officer d'Academie; corresponding member Royal Horticultural Society; Pharmaceutical Society; Agri.—Hort. Society of India; Fellow Royal Society, Haarlem; Corresponding Member of the Société Archéologique de France, etc., etc., *Publications*: Dictionary of the Economic Products of India (in 9 royal 8 vols.); Pests and Blights of the Tea Plant; Rhia and China Grass; Lac and Lac Industries of India; Monograph on Primula; Indian Art at Delhi in 1903; The Wild and Cultivated Cotton Plants of the World; Commercial Products of India, etc.

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INDEX

- Agra**, 264; medical school at and suggested improvements therein, 47, 69, 82, 91, 269; proposed school of art at, 82; proposed industrial school, 257.
- Agriculture**, classes attached to high schools in Bombay, 36-37; Dr. Voelcker's views on agricultural aspect of technical education, 113-15; measures for improvement, 124-27; college at Kanpur, 266; recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 282; *see also* Education, Agricultural.
- Schools, *see* Schools, Agricultural.
- Ahmedabad**, 159, 308; medical school at, 38-39.
- Ahmednagar**, Bombay, agricultural classes attached to high school at, 36.
- Akola**, Hyderabad, 53.
- Akra**, Bengal, 25.
- Akyab**, Lower Burma, survey school at, 49; opening of industrial branch of municipal high school at, 49.
- Alexander**, G.W., Clerk to the Glasgow School Board, 285.
- Aligarh**, U.P., 263.
- Allahabad**, U.P., law school attached to Muir College at, 26, 46; proposed industrial school at, 146, 257; proposed teachers' training college at, 146, 272; industrial conference at, 279.
- University, 97; proposed faculty of engineering in, 89, 91, 94; proposed institution of practical alternative entrance examination by, 89, 94, 95, 109; proposed faculty of medicine in, 91, 93; proposed Law College affiliated to, 270; *see also* Muir Central College, Allahabad.
- Aluminium**, progress of industry in Madras, 155, 198-99.
- America**, *see* United States of America.
- Amraoti**, Berar, Drawing classes attached to high school at, 38, 53.
- Amritsar**, Punjab, 45, 300.
- Anglicists**, The, controversy with the 'Orientalists', 10.
- Anjuman-Islamia**, founded in Madras, 154.
- Armstrong**, Prof. H.E., City and Guilds of London Institute, 286.
- Art Conference**, at Lahore, 197.
- Assam**, 54, 133, 264; state of technical education in, 18-19, 52-53; scholarships tenable at Sibpur Engineering College for students from, 113; industrial schools in, 52, 200.
- Auckland**, George Eden, Earl of, 10; biographical sketch, 319.
- Australia**, 302.
- Austria**, 194, 195.
- Ayrlon**, Prof. W.E., Professor of Physics in the City and Guilds of London Institute, 241.
- Baker**, James, visits technical schools in East Prussia, Poland and Bohemia, 194; biographical sketch, 319-20.
- Bangalore**, engineering college abolished, 23.
- Bankipore**, Bihar, C.P. students transferred to medical school at, 42.
- Bara Banki**, U.P., weaving school at, 234; talukdars favour Sherring's experiments with handloom at, 279.
- Bareilly**, U.P., proposed school of carpentry at, 244, 252, 260.

Baroda, 159, 304 ; Drawing classes attached to high school at, 38.

—Technological Institute, *see under* Technological Institutes.

Barron, Col.—, of Survey Dept., C.P., 140.

Barter, Solomon, Organiser of Manual Instruction to the London School Board, 284, 286.

Bassein, Burma, survey school at, 49.

Bazonji Dadabhoy, Khan Bahadur, *see* Dadabhai Bazonji, Khan Bahadur.

Belgaum, Bombay, agricultural classes attached to high school at, 36.

Bell,— 226.

Benares, *see* Varanasi.

Bengal, 15, 50, 74, 89, 132, 133, 134, 264, 265, 291, 304 ; statement showing condition of technical education in, 18-19 ; condition of technical education of higher or university character in, 24-26 ; state of technical education of school order in, 40-42 ; medical schools in, 41-42, 70 ; Government's response to Government of India's orders regarding improvements in practical and industrial training, 54 ; facilities for study of law commended, 67-68 ; measures regarding improvement of technical education in, 81-84, 111-12 ; Drawing made compulsory in training schools in, 109 ; Collin deputed to make industrial survey of, 111 ; schedule of different types of existing primary and technical schools in, 151 ; proposed establishment of subordinate engineering schools in, 169 ; allocation of technical scholarships for students from, 200, 209 ; position of practical education in, 287.

—Director of Public Instruction, *see* Croft, Sir Alfred.

Bengal Conference, convened to promote industrial development, 179-80, 182.

Bengal—Nagpur Railway, technical scholarships tenable in workshops of, 113.

Berar, 133 ; statement showing condition of technical education in, 18-19 ; proposed industrial school in, 53.

Bevis, A.W., Director of Manual Training to Birmingham School Board, 284, 285.

Benzonjee Mehta, Manager, Empress Cotton Mills, Nagpur, 305, 306, 311 ; endeavours for improvement in weaving industry, 312-14.

Bhownagjee, Sir M. M., tables question in House of Commons regarding institution of overseas technical scholarships for Indian students, 208.

Board of Control, proposed for co-ordinating works regarding industrial problems and problems of technical education, 253.

Board of Education, London, 220 ; comments on scheme regarding proposed overseas technical scholarships for Indian students, 218-19.

—Secretary, *see* Morant, Robert L.

Bohemia, 194.

Bombay, 24, 55, 70, 74, 89, 106, 107, 131, 133, 152, 163, 221, 228, 265, 291, 304 ; statement showing condition of technical education in, 18-19 ; condition of technical education of higher or university character in, 21-24 ; D.P.I. supports Dr. Cook's views seeking additional accommodation and increase to teaching power at Grant Medical College, 22 ; D.P.I. comments on university engineering classes, 23-24 ; state of technical education of school order in, 32-40 ; introduction of agricultural and art classes and bifurcation of studies in high school classes in, 36 ; Government's response to Government of

India's orders regarding improvements in practical and industrial training, 54 ; facilities for study of law deemed deficient in, 67-68 ; Drawing introduced in government high schools and training schools in, 109 ; attempts for promotion of technical instruction in, 110 ; veterinary college at, 111 ; schedule of different types of existing primary and technical schools in, 151 ; technological institute and veterinary school at, 167 ; services of Swedish Dairy expert utilised, 181 ; school of art at, 197 ; allocation of technical scholarships for students from, 200, 209 ; position of practical education in, 287-88.

—Technical Institute, *see* Victoria Jubilee Technical Institute, Bombay.

—University, 21, 55, 68 ; imparts practical training to engineering students, 23 ; statement showing number of persons graduated in law, medicine and engineering from, 28.

Books, *see* Text Books.

Bott, A.T., Senior Inspector of Schools to the Liverpool School Board, 285, 286.

Brandreth, Col.—Principal, Engineering College, Rurki, disapproves establishment of technical schools and suggests utilising existing workshops for practical work for selected students, 92.

British Indian Association, offer to establish School of Industry at Lucknow, 96-97.

Buck, Sir Edward, 4, 197, 272 ; report on practical education, 117-118, 122-44 ; report on technical education, 118, 145-95 ; endeavours to promote general industrial development, 235 ; papers connected with his report on technical and practical education, 281-314 ; visits Casanova Boy Artizan

School at Naples, 292 ; note on agricultural education in C. P., 297-99 ; biographical sketch, 320.

Buckmaster, C. A., Senior Inspector of Schools, 285.

Bunker,—, 49.

Burma, 70, 167 ; statement showing condition of technical education in, 18-19 ; state of technical education of school order in, 49-51 ; Government's response to Government of India's orders regarding improvements in practical and industrial training, 55-57 ; Drawing made compulsory in government and municipal schools in, 109 ; attempts for promotion of technical education in, 113 ; *see also* Rangoon.

Burn,—, Principal, School of Arts, Bombay, assists Buck in report on industrial schools, 160.

Burns,—, 226.

Butler,—, note on technical education, 275.

Buttons, proposal to start industry for manufacture of and recommendations of National Industrial Conference, 244, 252, 262.

Byculla, Bombay, industrial school at, 39.

Calcutta, 24, 106, 164, 182, 276, 277 303 ; Burmese students sent for studies in engineering and medicine to, 50 ; photography worked out to high level of perfection in Survey Office at, 185.

—Engineering College, 69 ; Burmese students sent for studies to, 50 ; C.P. awards technical scholarships for studies in, 51 ;

—Medical College, 40, 56 ; history and courses, 24-25 ; medical school attached to, 41 ; Government nominees from Burma sent for training to, 50.

- School of Art, 4, 197 ; working, 40-41, 111-12.
- University, 55, 68; Thomason Engineering College, Rurki, affiliated to, 26; statement showing number of persons graduated in law, medicine and engineering from, 28 ; Rangoon College affiliated to, 49 ; Tawney suggests institution of alternative entrance examination of practical character at, 80.
- Calder, Robert, H. M., Inspector of Schools in Scotland, 285.
- Cambay, Gujarat, 308.
- Campbell Medical School, Sealdah, 41-42.
- Canning College, Lucknow, 182 ; law school attached to, 26, 46.
- Carpentry, proposed school at Bareilly, 244, 252, 260.
- Casanova, Alfonso della Valle di, founds Boy Artizan School at Naples, 292.
- Casanova Boy Artizan School, Naples, working, 165-66, 224-25 ; industrial schools in India to be developed on lines of, 273 ; Radice's note on, 292-96.
- Cawnpore, *see* Kanpur.
- Central Provinces, 54, 131, 150, 162, 167 ; statement showing condition of technical education in, 18-19 ; students transferred to medical school at Bankipore from, 42 ; state of technical education of school order in, 51 ; Drawing made compulsory in primary schools in, 109 ; attempts for promotion of technical instruction in, 112-13 ; proposed utilisation of patwaris and kanungos to train school masters in geometrical drawing in, 140 ; schedule of different types of existing primary and technical schools in, 151 ; Fuller's endeavours for improvement in the system of agricultural education in, 170-71 ; position of practical education in, 287 ; Buck's note on agricultural education in, 297-99.
- Champneys, Basil, Architect, Indian Institute, Oxford, 45.
- Charter Act (1813), 10.
- Chatterjee, A.C., conducts industrial survey of N.W.P. & Oudh, 264, 268 ; advocates training of workmen in local industries, 278.
- Chatterton, Sir Alfred, Principal, School of Art, Madras, 155, 157, 190, 194, 226, 236, 242, 243, 300, 306 ; on study of Drawing, 139 ; appointed to deal with industrial education in Madras and his criticism of existing industrial schools, 153, 154 ; assists Buck in report on industrial schools, 160, 163 ; on qualities of Indian workman, 182 ; endeavours for establishment and extension of aluminium industry in Madras, 198-99 ; participates in National Industrial Conference at Nainital, 263 ; suggests measures for improvements in weaving industry, 304-05 ; biographical sketch, 320.
- Chhatisgarh, C.P., students sent as technical apprentices to, 52.
- China, to give instruction to local artizans suggestion to import expert from, 181.
- Clibborn, Col. J., Principal, Thomason Engineering College, Rurki, 165, 166, 190, 230 ; assists Buck in report on industrial schools, 160, 163 ; endeavours for establishment of night school at Kanpur for higher class workmen in foundries, 169 ; works out photography to high level of perfection in Rurki Engineering College, 185 ; appointed President of the Committee to report on industrial schools, 222 ; biographical sketch, 320-21.
- Coldstream,—, 176 ; moulds Indian art forms to foreign requirements, 188.

- Collin E. W., 179 ; conducts industrial survey of Bengal, 111.
- Colvin, Sir Auckland, Lt.-Gov., N. W. Provinces, 271, 272 ; suggests re-organisation of Rurki Engineering College, 4 ; *m.* on technical education in N.W.P. & Oudh, 89-107 ; appoints committee to examine question of technical education, 242 ; biographical sketch, 321.
- Committee on Technical Education, N.W.P. & Oudh, composition 106, 107 ; recommendations, 146.
- Committees of Public Instruction, established, 10.
- Conferences, *see* Art Conference ; Industrial Conference ; Simla Conference.
- Connaught, Duke of, Billiard room designed for, 45.
- Connemara Lord—, criticises working of Madras agricultural college and orders enquiry into causes of failure, 125, 172.
- Connemara Fort Library, 110.
- Cook, Dr.—, Principal, Grant Medical College, Bombay, 38 ; reviews college activities, 21-22.
- Cooke, John, Hony Secretary, Sloyd Association for Great Britain and Ireland, 286.
- Cookery, Laundry Work and Domestic Science, recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 282.
- Coopers Hill College, U.K., 214.
- Coorg, 54, 133 ; statement showing condition of technical education in, 18-19 ; arrangements for technical education of school order in, 53.
- Cotton, James Sutherland, on confusion in existing system regarding classification of schools in provinces, 132-33 ; biographical sketch, 321.
- 24—1 Dir of Arch/67
- Countess of Dufferin's Fund, for medical training of women, 69.
- Court of Directors, 9 ; despatch regarding technical education from, 1, 9 ; *see also* Secretary of State for India.
- Croft, Sir Alfred, D.P.I., Bengal, 98 ; disapproves of abolition of Sibpur workshops and emphasises need for practical workshop training to technical students, 100-03.
- Curzon, Lord —, 124.
- Cuthbertson, Sir John, Chairman, Glasgow School Board, 286.
- Cuttack, 24 ; medical school at, 41-42 ; survey school at, 42.
- Dacca (Presently in East Pakistan), 24 ; medical schools in, 41-42, 70 ; survey school at, 42.
- Dadabhai Bazonji, Khan Bahadur, participates in National Industrial Conference at Nainital, 263. |
- David Sassoon Reformatory, 39.
- David Yule, of M/s Andrew Yule & Co., 263.
- Dehra Forest School, *see* Imperial Forest School, Dehradun.
- Dehradun, U.P., Imperial Forest School at, 47-48, 167.
- Denmark, 281.
- Department of Revenue and Agriculture, *see* Imperial Department of Revenue & Agriculture.
- Despatches, *see* Educational Despatch, 1854.
- Dhulia, Bombay, agricultural classes attached to high school at, 36.
- Diggle, J. R., former Chairman, London School Board, 285, 286.
- D'Cruz, —, 49.

Drawing, working of classes attached to high schools, 37, 38, 53 ; study deemed essential as basis for technical instruction and proposal to introduce it as compulsory subject in schools, 80, 83, 85, 93, 108, 109 ; various branches of, 138 ; proposed arrangements for rapid progress, 139-40 ; recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 281.

Drill & Physical Exercises, recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 282-83.

Du Port, Rev. C. D., H. M., Chief Inspector of Schools in England, 285.

Duff, Sir Mountstuart Elphinstone Grant, 66 ; biographical sketch, 321.

Education,

—Agricultural, suggestions for improvement, 170-74, 205 ; Buck's note on state in C.P., 297-99 ; *see also* Kanpur, Agricultural College ; Poona, Agricultural College ; Madras, Agricultural College ; Saidapet, Agricultural College.

—Industrial, Buck's suggestions for improvements in, 118-21.

—Practical, Buck's report on, 117-18, 122-44 ; position in various provinces, 287-91.

—Primary, Imperial Resolution of 1897 suggests reforms in scheme of, 126-27.

—Technical, recommendations of Education Commission regarding, 1-2, 13-15 ; definition and suggested mode of introduction, 3-4 ; National Conference discusses proposals for development of, 5-6, 233-80 ; MacDonnell's, note on

and proposals for improvement of, 9-84, 272 ; statement showing condition in various provinces, 18-19 ; existing facilities for study of higher or university character in Madras Presidency, 20-21 ; in Bombay Presidency 21-24 ; in Bengal Presidency, 24-26 ; in N.W.P. & Oudh, 26-28 ; existing facilities for study of lower or school order in Madras Presidency, 28-32 ; in Bombay Presidency, 32-40 ; in Bengal Presidency, 40-42 ; in Punjab, 42-46 ; in N.W.P. & Oudh, 46-48 ; in Burma, 49-51 ; in C.P., 51-52 ; in Assam, 52-53 ; in Hyderabad & Coorg, 53 ; response by Provincial Governments to Government of India's orders regarding improvement in Practical and Industrial training, 54-57 ; Grigg's suggestions for extension of and introduction of new scheme of technical and industrial examinations by Madras Government in pursuance of the same, 57-66, 90 ; weaknesses in Madras scheme, 67 ; Royal Commission draw out scheme for introduction of, 72-74 ; Pedler classifies industries and professions likely to be made subject of study under, 75 ; proposal to introduce system of public examinations under universities for promotion of, 76, 80-81 ; Government urged to establish technical schools in every district for promotion of, 77-78 ; measures for improvement in Bengal, 80-84, 111-12 ; Government of India's proposal to promote such type of technical education as deemed serviceable to existing industries and agriculture, 86-88 Colvin's *m.* on 89-107 ; as viewed in Europe, 98-99 ; Committee appointed by N. W. Provinces Government to report on, and its recommendations, 106, 107, 146 introduction of Drawing in schools as preparatory to, 109 ; Dr. Voelcker on agricultural aspects of, 113-15 ; Buck's report on, 118, 145-95, 281-314 ; practical instruc-

tion in schools deemed essential preliminary to, 123-24; suggestions for improvement in higher class of technical instruction, 167-69; resolution of Simla Conference regarding, 202-07; proposed creation of Board of Control for co-operating works regarding industrial problems and problems of, 253; general prepositions to be observed in any scheme of, 255; Butler's note on, 275.

Education Commission on technical education, 1-2, 13-15; suggested bifurcation of studies in high school classes, 36; advocate gradual abstention by Government from higher education, 79.

Educational Despatch, 1854, 9, 11, 148; suggests reforms in secondary school course, 85.

Empress Cotton Mills, Nagpur, 303, 310. Engineering, emphasis on theoretical nature of teaching in colleges criticised, 2; statement of institutions in various provinces for study of, 18-19; facilities of higher or university character in Madras Presidency for study of, 20-21; in Bombay Presidency, 21-24; in Bengal, 24-26; in N.W.P. & Oudh; 26-28; college at Bangalore abolished, 23; statement showing number of graduates passed out from different universities in, 28; classes attached to school department of Poona College of Science and Hyderabad High School, 32-34; measures adopted by Government for preparing youths of indigenous races for profession of, 50; measures adopted by C.P. Government for promotion of studies in, 51; comments on university education in different provinces in, 69; proposed establishment in Allahabad University of the faculty of, 89, 91, 94; class opened at Nagpur, 113; subordinate school attached to Mayo School of Art, Lahore and proposed

establishment of subordinate schools in Bengal, 169; working of school at Jabalpure commended, 203; *see also* schools, Engineering; Calcutta, Engineering College; Madras, Engineering College; Sibpur, Engineering College; Thomason Engineering College, Rurki.

England, 59, 183, 194, 241, 284, 285, 291; Select Committee appointed to promote technical instruction in, 11; system adopted for extending and improving technical education in, 57; Technical Instruction Act introduced in, 123; proposed technical scholarships for Indian students for higher studies in, 200-01, 206-207, 208-21; to promote technical and industrial development, experts to be drawn from, and financial effect of the proposals, 244-45; handloom industry in, 303; Kelkar's visit to, 312.

Enthoven, R. E., appointed member of Committee to report on industrial schools, 222; note regarding handweaving, 304, 307-308.

Evans, Henry Farrington, appointed member of Committee on Technical Education, N. W. Provinces and Oudh and its recommendations, 146, 154-55, 157; biographical sketch, 322.

Examinations, Madras Government introduce new scheme of technical and industrial, 61-66; proposal to introduce system of public examinations under Universities for promotion of technical education, 76, 80-81.

Fategarh, U.P., use in Egyptian war of gun-carriage wheels made at, 183.

Fitch, Sir Joshua, formerly H.M. Chief Inspector of Training Colleges in England, 285, 286.

Forbes, Col. John Greenlaw, disapproves establishment of technical schools and suggests utilising existing

- workshops for practical work to selected students, 91-92 ; biographical sketch, 322.
- France, 57, 128, 139, 235, 281.
- Foundries, schools for training artizans in, 151, 156-57, 169.
- Fuller Sir (Joseph) Bampfylde, endeavours for improvement in system of agricultural education in C.P., 170-71 ; appointed Chairman of Committee for promotion of practical education in C.P., 287 ; biographical sketch, 322.
- Garnets, Tellery brought to India to teach Jaipur artisans to cut, 187.
- Germany, 57, 128, 139, 281, 297, 300, 304.
- Giles,—, 226, 288.
- Girdlestone,—, 53.
- Gladstone, J.H., F.R.S., formerly Member of the London School Board, 285.
- Goetze,—, on evils of education confined to literary instruction, 124.
- Gorakhpur, U.P., industrial school at, 48, 238, 246-47, 257.
- Government of India, recognise desirability of encouraging technical instruction and commend Education Commission's recommendation regarding bifurcation of studies in high school courses, 15.
- Grant, Sir Robert, Governor of Bombay, medical college founded in memory of, 21 ; biographical sketch, 322-23.
- Grant Medical College, Bombay, history and courses, 21-22 ; subordinate medical school attached to, 38.
- Graves, Alfred Perceval, H.M. Inspector of Schools in England, 285.
- Graves, Arnold, Honorary Secretary to the Technical Education Association, Ireland, 284.
- Grigg,—, D.P.I., Madras, 67, 80 ; on aims and scope of Madras scheme regarding technical instruction and introduction of new scheme of technical and industrial examinations by Madras Government in pursuance of the same, 57-66, 90.
- Guild of London Institute, 59.
- Gujranwala, Punjab, 45.
- Gwalior M. P., 300.
- Hamilton, Lord George Francis, Secretary of State for India, 208, 216, 217 ; on working and functions of schools of art, 197-98 ; seeks clarification on scheme regarding proposed overseas technical scholarships for Indian students, 213-15 ; biographical sketch, 323.
- Hance, Edward M., Clerk to the Liverpool School Board, 285.
- Harnam Singh, Sir, endeavours for Industrial development of country, 182, 187.
- Harris, W. T., Commissioner, National Bureau of Education, U.S.A., publications under his direction commended, 142.
- Hartley, Prof.—, College of Science, Dublin, 286.
- Hathras, U.P., 274 ; Proposed industrial school at, 257.
- Havell, Ernest B., Superintendent, Madras School of Arts, conducts enquiry regarding industrial survey in India, 110 ; biographical sketch, 323-24.
- Hawcrige, Arthur, Superintendent of Schools to Barrow-in-Furness School Board, 286.

- Hendley, Col. Thomas Holbein, brings Tellery to India to teach Jaipur artisans to cut garnets, 187; biographical sketch, 324.
- Henzada, Burma, survey school at, 49.
- Hewett, Sir John Perscott, Secretary, Home Department, Government of India, 201; Lieutenant-Governor, N. W. Provinces and Oudh, 234, 237, 239, 242; endeavours for technical and industrial development, 5, 235, 245; inaugural address at Nainital Industrial Conference, 262-80; biographical sketch, 324-25.
- Holderness, Col. Hardwicke, Director of Land Records and Agriculture, U.P., 89, 105; pleads for greater facilities for higher training in mechanical industries, 103, appointed member of Committee for promotion of technical education, 106-107; biographical sketch, 325.
- Holland, 128, 281.
- Holland, Mr.—, engaged in research regarding utilization of mineral products, 267, 276.
- Homan, Mrs.—, Member, London School Board, 286.
- Hooghly, 24.
- Horticulture, facilities for training at Lucknow and Saharanpur gardens in, 92.
- Hoshiarpur, Punjab, famous for inlay and wood-work, 45.
- House of Commons, Select Committee appointed to promote technical instruction in England, 11; question regarding institution of overseas technical scholarships for Indian students tabled, 208.
- Howrah, 228.
- Huxley, Prof.—, emphasises need for practical education, 126; urges introduction of Drawing in schools, 139.
- Hyde, —, 263.
- Hyderabad (Deccan), arrangements for technical education of school order in, 53.
- Hyderabad (Sind), agricultural classes attached to high school at, 36; medical school at, 38-39.
- Hyderabad Assigned Districts, *see* Berar.
- Iliot, Sir Charles, suggests re-organisation of Sibpur Engineering College, 4.
- Imperial Department of Education, proposed establishment, 142-43.
- Imperial Department of Revenue and Agriculture, established, 124.
- Imperial Forest School, Dehradun, 167; history and courses, 47-48.
- Imperial Resolution of 1897, 289; suggests reforms in schemes of primary education, 126-27; brings out defects in existing school text-books and suggests reforms, 135-38.
- Imperial Technological Department, Buck suggests creation of, 121.
- Imtiaz Ali, Munshi, pleads for establishment of technical school at Lucknow, 97.
- India, statement showing condition of technical education in different provinces of, 18-19.
- Indian Trade Journal*, 267.
- Industrial Conference, in Bengal, 179, 180, 182; at Varanasi, 277; at Allahabad, 279; *see also* National Industrial Conference, Nainital.
- Industrial Schools, *see* Schools, Industrial.

Industries, working of existing industries and suggestions for improvement, 179-95.

Insein, Burma, 56; state Railway workshop at, 49, 113.

Ireland, 127, 134; recommendations of Commissioners appointed to formulate scheme for manual and practical instruction and its recommendations, 127-30, 281-86.

Italy, 57.

Izat, —, Manager, Bengal and North-Western Railway, appointed member of Committee for promotion of technical education in N. W. Provinces and Oudh, 106.

J. J. School of Art, Bombay, working, 34-36.

Jacob, Col. Sydney Long, 175; his collection of Indian art, 177; biographical sketch, 325.

Jaipur, Rajasthan, 187.

Jalandhar, Punjab, 45.

Jamsetjee, Sir J., promotes technical education, 146.

Japan, 155, 213, 216, 218; to give instruction to local artisans, suggestion to import expert from, 181.

Jhang, Punjab, 45.

Jubbulpore, M. P., working of engineering school commended, 203.

Jullundur, *see* Jalandhar.

Kanpur, U. P., 149, 157, 162, 228, 239, 241, 244, 265, 273, 274, 301, 304; proposed survey school at, 92; agricultural school at, 112, 146, 172, 272; proposed night school for higher class workmen in foundries, 169; MacRobert promotes preparatory school for boys to be employed in mills and factories at, 190; proposed technological institute at, 236, 240-t,

42, 248-49, 253, 258-59, 276; proposed industrial school at, 238, 246-47, 257; agricultural college at, 266.

Kasur, Punjab, 45.

Keelan, Surgeon-Maj. —, 38.

Kelkar—, of Poona, trip to England to perfect his invented hand-loom, 312.

Kerr, J. G., Headmaster, Allan Glen's School, Glasgow, 284, 286.

Kimberley, John Wodehouse, First Earl of, Secretary of State for India, 197; biographical sketch, 325-26.

Kipling, John Lockwood, Principal, Mayo School of Art, Lahore, 46, 76; on nature of teaching in school, 45; biographical sketch, 326.

Kirkham, —, on technical education as viewed in Europe, 98-99.

Kishnagar, Bengal, 24.

La Touche, Sir James, 274.

Lahore, 149, 151; law school, 42-43; medical school, 43-44; medical college, 68-69; art school, 91, 139, 197; Railway Technical Institute opened, 112; school for training artisans in foundries and workshops at, 151, 156-157, 169; veterinary school at, 167; engineering class attached to art school at, 169; art conference at, 197, *see also* Mayo School of Art, Lahore.

Lally, Rev. P., Hony Secretary, Galway Technical school, 286.

Landowners, neglect estates, 174.

Law, facilities of higher or university character in Madras for study of, 17; facilities in Bombay, 21; in Bengal, 24; in N.W.P. and Oudh, 26; statement showing facilities in various provinces for study of, and number of persons graduated from different

- universities in, 18, 19, 28; chair established at Rangoon College, 49; Madras and Bombay deemed deficient in providing facilities for study of, 67-68; proposed college affiliated to Allahabad University, 270; *see also* schools, Law.
- Law, Sir Edward, on technical education in India, 155.
- Leather, proposed establishment in N. W. Provinces of factory for manufacture of chrome leather suited to agricultural requirements, 243; recommendations of Nainital Industrial Conference regarding the industry, 262.
- Lee-Warner, —, views on technical training, 32-34; comments on working of J. J. School of Art, Bombay, 34-36; on drawing classes attached to high schools in Bombay, 37-38.
- Lewis, —, 226.
- Locke, —, favours study of Drawing in schools as preparatory to technical instruction, 80.
- London, 45; school of Design established, 11.
- Low, Sir James, formerly Lord Provost of Dundee, 286.
- Lower Burma, *see* Burma.
- Lucknow, 151, 192, 263; law school attached to Canning College at, 26, 46; proposed establishment of School of Arts and Industry at, 89, 93, 96, 97, 112, 146, 242; facilities for training in horticulture at, 92; proposed survey school at, 92; proposed school of Design at, 249-50, 259; *see also* Canning College, Lucknow.
- Industrial school, 96-97, 112, 146, 190, 226, 270, 272, Sir MacDonnell's efforts for improvement, 161, 165; to prepare students for subordinate classes of Rurki College, 169; to teach improved methods to artisans, sons and workmen, 190; proposed enlargement, 238, 244, 246-47, 257.
- Lyall, Sir, Alfred Comyn, I.C.S., 174; expresses gratification at the move for establishment of technical school at Lucknow, 97; biographical sketch, 326.
- MacDonnell, Sir Antony, Patrick, Secretary, Home Department, Government of India, 1, 269, 270, 289; note on technical education in India and proposals for improvement, 2, 9-84, 272; Lieutenant-Governor, N. W. P & Oudh; endeavours for improvement of Lucknow industrial school, 161, 165; on working of industrial schools, 275-76; biographical sketch, 326.
- Mackenzie, Sir Alexander, 287.
- Macrae, Colin G., Chairman, Edinburgh School Board, 285, 286.
- MacRobert, —, President, Chamber of Commerce, Kanpur, promotes preparatory school for boys to be employed in mills and factories at Kanpur, 157, 190.
- Madras, 15, 24, 55, 59, 67, 68, 70, 89, 106, 107, 133, 149, 150, 155, 162, 163, 236, 291, 304; bifurcation of studies in high schools introduced in, 2; condition of technical education of higher or university character in, 17, 20-21; statement showing various technical institutions in, 18-19; condition of technical education of lower or school order in, 28-32; school of art at, 28-29, 110, 139, 197, 291; D.P.I. on progress of technical education in, 32; Burmese students sent as Hospital Assistants for training to, 50; Government's response to Government of India's orders regarding improvement in practical and industrial training, 54, 57-66; facilities for study of law deemed deficient in, 67-68; attempts for development of scientific and technical instruction in, 90, 109-110; study

- of drawing introduced in training schools in, 109; Victoria Technical Institute at, 110; schedule of different types of existing primary and technical schools in, 151; Chatterton criticises existing industrial educational system in, 153, 154; Anjuman-Islamia founded at, 154; establishment and extension of aluminium industry in, 155, 198-99; allocation of technical scholarships for students from, 200, 209; handloom cotton-weaving and chrome leather industry at, 242, 243; position of practical education in, 288;
- Agricultural College, 172; enquiry ordered into causes of failure of, 125; emphasis on theoretical training criticised, 204.
 - Engineering College, history and courses, 20-21; suggestion for imparting practical training in, 69, 82; commended, 203;
 - Medical College, history and courses, 20.
 - University, 20, 60, 68; statement showing number of persons graduated in law, medicine and engineering from, 28.
- Madura, Madras, medical school at, 29.
- Magnus, Sir Philip, City and Guilds of London Institute, 284.
- Mahisadul, Midnapur District, Bengal, industrial school at, 42.
- Mahratta*, The, advocates introduction of practical and technical training, 12.
- Manchester, U. K., 245, 304, 314.
- Marris, W. S., Under Secretary, Home Department, Government of India, 220.
- Martel, —, on evils of education confined to literary instruction 124.
- Matches, recommendations of Nainital Industrial Conference regarding the industry, 26.2
- Mayo, Lord —, Governor-General and Viceroy of India, 9.
- Mayo School of Art, Lahore, 112; working, 44-46; subordinate engineering school attached to, 169.
- Medical Schools, *see* Schools, Medical.
- Medicine, statement showing facilities in various provinces for study of, 18-19; facilities of higher or university character in Madras for study of, 20; facilities in Bombay, 21-22; in Bengal, 24-25, statement showing number of persons graduated from different universities in, 28; measures adopted for preparing youths of indigenous races for profession of, 50; comments on university education in different provinces in, 68-69; proposal for establishment in Allahabad University of the faculty of, 91, 93; *see also* Schools, Medical.
- Meerut, U. P., 265; proposed establishment of industrial school at, 257.
- Mercara, Coorg, working of Central school at, 53.
- Mill, J. S., 11.
- Mining, proposal to institute overseas scholarships for Indian students for higher training in the industry, 221.
- Missionaries, The, in charge of industrial schools at Gorakhpur and Varanasi, 48.
- Monday, —, favours study of drawing as basis for technical instruction, 80.
- Moradabad, U.P., famous for inlaid ware, 176; proposed demonstration weaving school at, 260.
- Morant, Robert L., Secretary, Board of Education, London, comments on scheme regarding proposed overseas

- technical scholarships for Indian students, 218-19.
- Moreland, —, Director of Land Records and Agriculture, N.W.P. & Oudh, assists in conducting industrial survey of the province, 264.
- Morris, Edmund, Instructor in wood-work to the Barrow-in-Furness School Board, 284.
- Muhammad Husain, Sayyid, Fellow and Member of the Faculty of Art, Allahabad University, 93.
- Muhammadans, Anjuman-islamia founded in Madras for improving conditions of, 154.
- Muir Central College, Allahabad, law school attached to, 26, 46; *see also* Allahabad University.
- Multan, Punjab, famous for pottery and ivory carving, 45.
- Murray, S. M. C., Headmaster, Sciennes Public School, Edinburgh, 284, 286.
- Mysore, students to study engineering in Poona College of Science from, 23, 24, 33.
- Nabha, Punjab, 45.
- Nadiad, Bombay, agricultural classes attached to high school at, 36.
- Nagpur, 52, 171, 263; Drawing classes attached to high school at, 38; abolition of medical school at and students transferred to Bankipore from, 42; agricultural and engineering classes at, 113, 172; government cotton farm at, 297, 303, 314; Empress Cotton Mills at, 303, 310.
- Nainital, U.P., industrial conference at, 233-80.
- Nainital Industrial Conference, *see* National Industrial Conference.
- Naples, 5, 192, 193; Casanova Boys Artizan School at, 165, 166, 224-25, 273, 292-96.
- Naples Industrial School, *see* Casanova Boys Artizan School, Naples.
- Nash, —, 112, 133.
- Nasik, Bombay, agricultural classes attached to high school at, 36.
- National Industrial Conference, Nainital, summoned to mature proposals for development of technical education, 5, 233-80.
- Needlework, recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 282.
- Nellore, Madras, medical school at, 29.
- Nelson, William, Superintendent of Manual Instruction to the Manchester School Board, 286.
- Nichols, —, 49.
- Nicholson, —, urges need for training rural population by practical methods before imparting technical instruction in agriculture, 125.
- North-Western Provinces, 54, 150; Nainital Conference summoned for development of technical education in, 5, 233-80; statement showing condition of technical education in, 18-19; state of technical education of higher or university character in, 26, 28; law schools in, 26, 46, 68; state of technical education of school order in, 46-48; medical schools in, 47, 69, 70, 82, 91, 269; Colvin's *m.* regarding technical education in, 89-107; attempts for promotion of technical instruction, 106, 112, 146; appointment of Drawing teachers suspended for want of funds, 109; schedule of different types of existing primary and technical schools in,

- 151; services of Swedish dairy expert utilised, 181; proposed establishment of factory for manufacture of chrome leather suited to agricultural requirements, 243; position of practical education in, 289, *see also* Oudh, United Provinces.
- Norway, 281.
- Oil Mill Industry, recommendations of Nainital Conference regarding, 261.
- 'Orientalists', The, controversy with the, Anglicists', 10.
- Oudh, 234; proposed technical school in, 91, 96, 97; population, 264; *see also* N. W. Provinces and United Provinces.
- Oulton, William, Vice-Chairman, Liverpool School Board, 285, 286.
- Padshah, B. J. Hony. Secretary, University of Research, Bombay, 305, 312, 313, 314; views sought regarding improvements in weaving industry, 309-11.
- Paper, recommendations of Nainital Industrial Conference regarding the industry, 262.
- Paris, deputation of an Indian for studying silkworm diseases to, 155.
- Patna, Bihar, law school at, 24; medical school at, 41; survey school at, 42.
- Pedler, Sir Alexander, 185, 226, 289, 290; classifies industries and professions likely to be made subject of technical education, 75; favours study of Drawing as basis for technical instruction, 80; supports Tawney's suggestions regarding improvement of technical instruction in Bengal, 81-82; biographical sketch, 326-27.
- Pegu, Burma, survey school at, 49.
- Perry, James, County Surveyor, Galway, 286.
- Perry, Sir Thomas Erskine, formerly Chief Justice, Bombay, law school founded in memory of, 21; biographical sketch, 327.
- Photography, worked out to high level of perfection in Calcutta Survey Office and at Rurki College, 185.
- Poland, 194.
- Poona, law classes in Deccan College, 21; engineering school, 32-34; medical school, 38-39; cotton farms, 304.
- Agricultural College, 172; emphasis on theoretical training criticised, 204-05.
- College of Science (Engineering College), 69, 277; history and courses, 22-23; school department of, 32-34; C. P. awards technical scholarships for studies in, 51; working, 111; commended, 203.
- Prussia, 194, 235.
- Punjab, 54, 132, 133, 163, 291; statement showing condition of technical education in, 18-19; technical education of school order in, 42-46; gift to Indian Institute at Oxford by the Government of, 45; medical schools in, 70; attempts for promotion of technical instruction in, 112; schedule of different classes of existing primary and technical schools in, 151; position of practical education in, 289.
- Radice, C. A., 159, 193; on working of industrial schools in Naples, 165, 166; appointed member of Committee to report on industrial schools, 222; note on Casanova Boy Artizan School, 292-96.
- Rajahmundry, Madras, 60.
- Rajpur, U.P., proposed attachment of class for learning glass blowing to the factory, at, 244, 260.

Ram Singh, Asstt Master, Mayo School of Art, Lahore, joins Kipling in designing Billiard-room for Duke of Connaught, 45.

Ramsey, Prof. —, 165, 192.

Ranchi, Bihar, 314.

Rangoon, Burma, survey school at 49; college in Arts affiliated to Calcutta University and Chair of Law established, 49; proposed medical school at, 51, 70, 82.

Ratnagiri, Bombay, industrial school at, 39.

Resolution, Revenue & Agricultural Department (1895), emphasises need for technical education to be preceded by practical education in schools, 125-26.

Revenue & Agriculture Department, *see* Imperial Department of Revenue & Agriculture.

Rice, Dr. —, Inspector-Gen., Civil Hospitals, U.P., disapproves proposal for establishing institute for higher medical studies, 93.

Ripon, Lord —, 269.

Ripon Memorial Fund, 110.

Ripon Textile School, working 110-11.

Risley, Sir Herbert, 237.

Rivaz, —, 289.

Robb, Dr. —, 38.

Robinson, George H., Headmaster, Board School, Birmingham, 284, 285.

Rooper, T. G., H. M. Inspector of Schools in England 284, 285.

Roorkee, *see* Rurki.

Roorkee Engineering College, *see* Thomason Engineering College, Rurki.

Rotterdam, Holland, 33.

Royal Commission on Technical Education, draw out a system of education for introduction of technical instruction, 72-74.

Royapuram, Madras, medical school at, 29.

Rurki, U. P., 103, 104, 105, 106, 244, 260; proposed industrial school at, 146; engineering branch of technological institute proposed for U. P. to be located at, 239-40, 247-48, 258; *see also* Thomason Engineering College.

Russel, Scott, on technical education as viewed in Europe, 98.

Sadler, Sir Michael Ernest, on evolution of practical education, 122; biographical sketch, 328.

Saharanpur, U. P., facilities for training in horticulture at, 92; proposed demonstration weaving school at, 260.

Saiad Muhammad Husain, *see* Muhammad Husain, Sayyid.

Saidapet, Madras, college of agriculture at, 110.

Schaumburg, —, favours study of Drawing as basis for technical instruction, 80.

Scholarships, awarded by Burmese Government for promotion of technical education, 50-51; awarded by C. P. Government, 51-52; tenable in Bengal-Nagpur Railway workshops, 113; proposed for overseas studies in higher branches of technical education, 200-01, 206-07, 208-21.

Schools, Education Commission suggest bifurcation of studies in, 1, 2, 13; study of Drawing deemed essential as basis for technical education and proposal to introduce it as compulsory subject in, 80, 83, 85, 93, 108,

109; Imperial Resolution of 1897 draws attention to defects in text-books used in, and suggests needed reforms, 135-138.

— Agriculture, statement showing state of schools in various provinces, 19; in Madras, 31; at Kanpur, 112, 146, 172, 272; at Nagpur, 172.

— Art, statement showing condition of schools in various provinces, 18-19; in Madras, 28-29, 110, 139, 197, 291; at Calcutta, 40-41, 111-12; proposed at Agra, 82; at Lahore, 91, 139, 169, 197; proposed at Lucknow, 97, 112, 146, 242; working and suggestion for improvement, 155-56, 175-77, 197-98, 203-04; *see also* Calcutta, School of Art; Mayo School of Art, Lahore.

— Carpentry proposed at Bareilly, 244, 252, 260.

— Design, established in London, 11; proposed at Lucknow 249-50, 259.

— Engineering, organisation and courses in Madras, 29-30; at Poona, 32-34; existing subordinate schools, 169; working of school at Jabalpure commended, 203.

— Industrial, establishment suggested, 4-5; number and different types of schools existing in various provinces, 19, 151-59; in Madras, 30-31; in Bombay 39-40; in Bengal, 42; in Punjab, 46; at Lucknow and other places in U. P., 48, 96, 112, 146, 161, 165, 169, 190, 226, 238, 244, 246-47, 257, 270, 272; in Assam, 52, 200; proposed for Berar, 53; comments on working and suggestions for improvement, 71-72, 77-79, 159-67, 198-200, 205-06, 222-32, 272-73, 275-76.

— Law, in Madras, 17; in Bombay, 21; in N.W.P. and Oudh, 26, 46; at Lahore, 42-43.

— Medical, in Madras, 29; in Bombay, 38-39; in Bengal, 41-42, 70; at Lahore, 43-44; at Agra, 47, 69, 82, 91, 269; proposed at Rangoon, 51, 70, 82; comments on working, 69-70; *see also* Temple Medical School, Patna.

— Primary, alleged defects in text-books used in, and principles suggested to be observed in framing of school books for, 135-38; schedule of different types of schools in various provinces, 151; recommendations of Irish Commissioners as to form of manual and practical instruction to be included in educational system of, 281-86.

— Secondary, Government of India commend Education Commission's recommendation regarding bifurcation of study courses in, 15; 1854 Despatch suggest reforms in courses in, 85.

— Sericulture, in Bengal, 155.

— Survey, at Dacca, Patna and Cuttack 42; in Burma, 49; in Assam, 52; comments on working, 70-71; proposed at Kanpur, 92.

— Technical, demand for establishment of, 12; proposed at Lucknow, 96-97; schedule of different types of schools in various provinces, 151; *see also* Education, Technical.

— Veterinary, at Bombay and Lahore, 167.

— Weaving, in U. P., 234, 242, 250-51, 260.

Science, Elementary, Imperial Resolution of 1897 suggests desirability of employing medium of readers and object lessons for teaching of, 137-38; recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 281-82.

Scotland, 129, 284, 285.

Scougal, A. E., H.M. Inspector of Schools in Scotland, 285, 286.

Sealdah, Bengal, medical school at, 41.

Secretary of State for India, sanctions upgrading of Lahore Medical School, 43-44; *see also* Court of Directors; Hamilton, George Francis; Kimberley, John Wodehouse.

Seebpore, *see* Sibpur.

Select Committee, appointed by House of Commons for promotion of technical instruction, 11.

Serampur, Bengal, reputed for fabrics, 303.

Shakespeare, —, represents Kanpur chamber of Commerce in Nainital Industrial Conference, 236.

Sherring, —, experiments with handloom at Bara Banki, 279.

Sholapur, Bombay, agricultural classes attached to high school at, 36.

Sialkot, Punjab (Presently in Pakistan), 45.

Siam, 213, 218.

Sibpur, Engineering College (Bengal), 40, 69; history and courses, 25-26; abolition of workshops attached to engineering college and comments thereon, 100-03; admission qualifications raised and certain appointments in P.W.D. guaranteed for passed students, 111; scholarships for Assamese students tenable at, 113; commended, 203.

Simeon, J., special industrial branch of municipal high school, Akyab, opened under, 49.

Sime, —, 289.

Simla, Punjab, educational conference at, 4-5, 196, 202-07, 269, 271, 273, 276.

Singing, recommendations of Irish Commissioners regarding form of study of the subject under primary educational system, 282.

Sly, —, 226.

Smith, T., Manager, Allahabad Bank, Kanpur, 263.

Spring, Sir Francis Joseph Edward, disapproves of abolition of Sibpur workshops and emphasises need for practical workshop training to technical students, 100; biographical sketch, 328.

Stanley, Hon. E. Lyulph, Member, London School Board, 285.

Surat, Bombay, agricultural classes attached to high school at, 36; Kinkob workers, of, 308.

Sweden, dairy expert from, 181, 306.

Switzerland, 57, 128, 139, 281; to give instruction to local artizans, suggestion to import expert from, 281.

Tanda, U. P., proposed demonstration weaving school at, 260.

Tanjore, Madras, medical school at, 29.

Tarbut, G. J., Headmaster, Continuation, School, Dundee, 286.

Tawney, Charles Henry, on utility of existing industrial schools and favours establishment of technical schools as integral part of provincial educational system, 77-78; suggestions for promotion of technical education, 80-81; biographical sketch, 329.

Taylor, F. E., Secretary, U. P. Government, 233.

Taylor, John, Headmaster, Board School, Birmingham, 285.

Teachers, establishment of a training college at Allahabad for, 146, 272.

Technical Instruction Act, introduced in England, 123.

Technological Institute, at Bombay and proposed establishment at Baroda, 167; proposed for U. P., with bifurcation of engineering and chemical branches at Rurki and Kanpur respectively, 235-36, 239-42, 247-49, 253, 258-59, 276.

Tellery, —, purveys abroad in hand-made Indian products, 186; brought to India by Col. Hendley and support given to, 187, 189, 190; endeavours for industrial promotion, 194, 300-01, 306.

Temple, Sir Richard, 37; biographical sketch, 329-30.

Temple Medical School, Puna, 41-42.

Text-books, defects as brought out by Imperial Resolution of 1897 in existing school books and reforms suggested, 135-38.

Textile, proposal to institute overseas scholarships for Indian students for higher training in the industry, 221; recommendations of Nainital Industrial Conference regarding, 261.

Thomas, Rev. Brother, Principal, De La Salle Training College, 286.

Thomason, James, Lieut.-Gov., N. W. Provinces and Oudh. establishes Civil Engineering College at Rurki, 26; biographical sketch, 330-31.

Thomason Engineering College, Rurki, 46, 91, 182, 183, working and progress of, 26-27, 269, 270, 272, 274; suggestions for reorganisation, 69, 82, 112, 146, 234, 239-40; Lucknow

Industrial School to prepare students for subordinate classes of, 169; photography worked out to high level of perfection in, 185; commended, 203.

Thomson, Dr. —, 226.

Thurston, —, endeavours for improvement in handloom weaving in Madras, 304-05.

Tobacco, recommendations of Nainital Industrial Conference regarding the industry, 261.

Toungoo, Burma, 49.

United Provinces, establishment of technological institute proposed for, 235-36, 239-42, 247-49, 258-59; *see also* North-West Provinces; Oudh.

United States of America, 186, 212, 215, 218, 302; creation of National Bureau of Education and its working commended, 142-43; preventive measures against blight for crop promotion taken in, 171.

Universities, proposal to promote technical education by instituting system of public examinations under, 76, 80-81; proposed alternative entrance examination in practical knowledge, 109; *see also* Allahabad University; Bombay University; Calcutta University and Madras University.

Varanasi, U. P., 234, 279; law school attached to college at, 26, 46; industrial school at, 48; proposed weaving school at, 243, 250-51, 260; industrial conference at, 277.

Veterinary Schools. *see under* Schools.

Victoria Jubilee Technical Institute, Bombay, 98, 151, 186, 241, 277; established, 110; working, 158-59; class for mechanical engineers at, 169; commended, 203.